ARCHIVES OF OPHTHALMOLOGY.

# A CASE OF GLIOMA OF THE PONS (BEARING UPON THE QUESTION OF NUCLEAR PARALYSIS AND THE GENESIS OF CHOKED DISC.

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(*With 4 drawings.*)

In many cases, bilateral implication of the same pair of ocular nerves, such as the abducens or oculo-motorius, would lead us to think of an affection of the nerve nuclei.

This supposition is strengthened if changes in the degree of the paralysis are noted, as such variations are seldom observed in paralysis due to interruption or interference with the conducting nerve fibres, in direct contradistinction to those of central origin.

Mauthner writes[1]: "A bad wire always shows the same degree of poor conduction,"—an aphorism, however, to which there are many exceptions. Nevertheless, this variability is frequently noticed, not only in paralyses of the muscles of the eye, but also in typical bulbar paralysis, incidental to these and depending upon degenerative changes in the nuclear region of the central gray matter (polyencephalitis) of the medulla oblongata.

Bearing this in mind, as well as the fairly typical progression of the manifestations of disease shown by the following history, one might have expected to find an affection of the nuclei lying in the floor of the fourth ventricle, which, passing forwards, first attacked the abducens, and then implicating the hypoglossus, facialis, and vago-accessorius

[1] Die ursächlichen Momente der Augenmuskel-Lähmangen, 1885.

regions, finally resulted in total paralysis, owing to the spread of the disease to the lateral pyramids of the spinal cord. The autopsy demonstrated a glioma in the ventral surface of the pons, which had destroyed the tracts in the pyramids, but had not affected the nuclear region. The paralysis observed in the distribution of the cranial nerves—excepting that caused by direct disease of the abducens—was principally due to the pressure at their origin.

Catherine B., 20 years old, received at the clinic Nov. 14, 1885, says she has always been healthy. About six weeks ago was taken with vertigo and headache and noticed several days that she saw every thing double. Diplopia persisted about three weeks and then disappeared. In the meantime a convergent strabismus of the right eye developed. Headache better, but frequent attacks of vertigo, which were worse at night. Menstruation normal.

When received, patient's appearance was healthy ; nothing abnormal with heart or internal organs. Urine free from albumen and sugar. No syphilis. The right eye is deflected internally and shows defective motion outwards of 3 *mm* as compared with the left eye.

No diplopia observed spontaneously ; with red glasses the double images are homonymous and diverge when the eye is rotated outwards. Except the paresis of the right abducens there is nothing abnormal in either eye. Perfect vision and good accommodation on both sides, Right H 0.5, Left emmetropia. The facial muscles seem normal, except that the left naso-labial fold is somewhat smoother and the left corner of the mouth a little lower. On the other hand, the mouth can be completely closed, she can whistle, etc. At times, however, during the period of observation there were slight variations in this ; the right angle of mouth being sometimes lower, while with closed lips the corners of the mouth were not always equally sharp and pointed. A slight impediment is noticed in the speech, but patient claims this has always existed. No abnormality of tongue or palate. No other paralytic symptoms or disturbances of sensation are present. Patellar reflex somewhat increased. Reflex clonus of foot barely perceptible. Several days later, it was noticed that the paralysis of the right abducens is less, but paralysis of the same muscle now appears on the left side. Motion and size of pupil normal on both sides. At the same time the patient complains of a fresh attack of headache and vertigo.

There is some unsteadiness with closed eyes, but this disappeared several days after. Until Dec. 2d, the left abducens paralysis continued to develop gradually, with variations as on right, while the right side was, if any thing, somewhat better. Dec. 9th: Patient complains of a sound like boiling water in the left ear. *Mt* normal. After the tuning-fork is no longer heard on the vertex, it is still perceived before the ear. There is no remarkable decrease of hearing. Pain in head and vertigo have ceased. Dec. 17th: Vomiting this morning and pronounced vertigo even while recumbent. Speech is thicker as though the patient could not move the tongue well, but stretches it out as usual. Temperature 38.2°, pulse 100–112. Repeated vomiting the following day. Tottering gait, with a tendency to lurch to one side. Muscular strength as well as sensibility is undisturbed. Knee and foot reflexes are present. Fundus of eye normal. Sense of color and light also physiological (with Förster's photometer).

In the course of the month patient's general condition improved somewhat, but in January the disturbance of gait became more and more remarkable. She is now often peevish and complains of nausea and vomiting. Temperature not elevated, but pulse 120. Disturbance of speech is becoming more marked; she pronounces few words distinctly. Difficulty of deglutition and occaional regurgitation of the food through the nose. These latter symptoms vary, however, with any improvement in the general condition. Jan. 16th: No headache and while in bed no vertigo. Is very much prostrated and sits up with difficulty. Gait very tottering with dragging of feet. Roaring in the left ear occasionally. Left naso-labial fold contracts somewhat less than the right when laughing, and when whistling the mouth is drawn to the right. Cannot wrinkle the forehead, nor open the mouth wide. Tongue drawn somewhat to the right when protruded. Speech labored, slow, the sibilant sounds especially indistinct. Patient prefers to swallow solid food, as fluids regurgitate through the nose. Taste intact, smell somewhat deficient, but she is suffering from a cold. She hears well, and answers correctly, as far as one can understand her. The sensibility, active and passive motion, and bodily power are not diminished. The reflexes are increased, but vary; sometimes the thigh and leg are in clonic convulsion for a minute after tapping the patella. The foot clonus is likewise exaggerated. The muscles of the face and extremities still respond to both constant and induced currents. Swallowing may

be caused by placing the electrodes of the galvanic current upon the nape of the neck and larynx, and is improved by every application. Organs of the breast and the heart are normal. Pulse 100–120. Temperature not elevated. Toward the end of January the condition was much worse. Gradual and extensive paresis and paralysis of the muscles of the back and extremities have appeared, so that the patient can no longer move herself. The sphincter muscles of bladder and rectum remained active to the end. There is more and more difficulty of swallowing and a sound must be used to nourish the patient. No change of the lingual muscles is apparent. Several days before death the mouth closed firmly, necessitating rectal alimentation. The speech varied in distinctness even to the last. On January 26th, when the patient's mother arrived, she seemed decidedly better.

Jan. 28th: Repeated vomiting was followed by a rise of temperature (38.7°–39°). Respiration 72, shallow; occasionally rattling in the trachea. Patient very pale and sometimes cyanotic. She can now neither speak, swallow, nor open the mouth, and the muscles of the trunk and extremities are completely paralyzed. Passive motion of legs is restrained, to a less degree in the arms. Knee reflexes are barely perceptible. Foot clonus not so marked as before. Movements of the eyelids and muscles of the eye, excepting the external recti, are normal. Pupils react to light and are regularly contracted and dilated. When spoken to, patient hears and understands, but responds only by a slight, almost imperceptible, shaking motion of the head. The facial muscles remain immovable and respond more strongly to the constant current than before. Swallowing is easily performed. As the patient was raised to examine the posterior parts of the lungs, breathing ceased suddenly and she was at once laid down and artificial respiration instituted.

The background of the eye had hitherto shown nothing abnormal, but Jan. 29th, a slight change was noticeable: the papilla of the optic nerve and the adjoining retina seemed slightly hazy. A distended vein is noticed in the right eye, coming from below and showing a distinct pulsation (even beyond the papilla) which was not noticed before. All these phenomena, however, exceeded the physiological limits to such a slight extent, that they could hardly be rated as pathological, except by comparison with the earlier appearances.

Jan. 30th: The respiration became irregular and occasionally in-

terrupted. The patient lay perfectly immovable and stiff, but was conscious. Death followed at 5 o'clock in the morning of Jan. 31st.

Autopsy, noon, Feb. 1st, by Professor Marchand.

Body well formed and pretty well nourished. Right pupil very much contracted; left moderately dilated. The cranium is of ordinary thickness, transparent, with smooth inner surface. Symmetrical tension of the dura mater, not exceeding the normal; its vessels are pretty well filled, especially the veins. A soft clot of blood in the longitudinal sinus. Inner surface of dura mater smooth and shiny. Pia mater upon the surface of the brain is delicate throughout; its vessels moderately injected, the veins of the posterior region more noticeably congested; no œdema. Upon removal of the brain, the base shows an irregular swelling of the pons, embracing both halves, but more especially the right side. The swelling is due to a soft tumor-like mass growing forward from both sides, and showing a gutter or depression at its middle, in the depths of which lies the Art. basilaris, congested but somewhat contracted. The mass of the tumor is of a pale reddish color, and shows on the right near its centre, a darker, partly brown spot, 1 *cm* in diameter. The surface of the tumor is covered with numerous small congested vessels. Anteriorly the mass reaches to the crura cerebri, on both sides and seems to encroach upon them in part. The basis of both crura is likewise swollen, and this portion is divided from the part lying above it by a groove, in which the posterior cerebral artery is discovered. Both oculo-motorii are seen issuing from the swollen part of the crura, but their substance is unchanged. The left trigeminus lies pressed flat against the tumor and is reddish-gray while the left is more whitish and less compressed. Both trochlear nerves cross the tumor without change; both abducens nerves, however, are seriously implicated. The right nerve, at its origin, can only be recognized in places as a white streak, partly overgrown by the translucent pale gray masses. Farther forward, the nerve appears as a whitish band, flattened down upon the under surface of the tumor. The left abducens is much flattened in its first part and partly concealed by the hilly prominences of the mass; farther it appears more distinct, is paler and more translucent. At the under surface of the pons there is nothing left of normal substance. The greatest length of the tumor, left, is 4.5 *cm*, right, 4.5 *cm*, its greatest width 5.5 *cm*.

The shape of the tumor was probably determined by the con-

tour of the skull. The facial and acoustic nerves are somewhat flattened, but white.

The upper part of the medulla oblongata is greatly misshapen, broad, short, with pyramids, and olives projecting but little from the general mass. The right tonsil of the cerebellum is pushed downwards and forwards into intimate contact with the medulla.

Section through the middle of the pons and crura cerebelli ad pontem shows the mass of the tumor of a pale reddish-gray color penetrating deeply into the substance, but not sharply defined from its surroundings. The parts lying towards the middle and base are especially homogeneous, transparent, and pretty solid. The right half of the pons is also, for the most part, involved in the same tumor, so that only a few traces of the pyramid bundles and the arched fibres of the posterior part of the anterior section stil remain. These latter fibres are somewhat more distinct on the left side. The mass then penetrates somewhat farther into the crura cerebelli. A series of punctate, congested vessels are seen, especially numerous on other parts of the section, but no distinct hemorrhages.

The posterior section of the pons is about 1 *cm* thick, and apparently unchanged, although its substance is somewhat soft. The cerebellar substance is unchanged. The lateral ventricles are somewhat enlarged. Frontal section of the brain shows no change. The cortex is about 3 *mm* thick and reddish-gray. Gray matter similar in coloration. White matter anæmic.

Macroscopically, the spinal cord, heart, and abdominal viscera offer no appreciable pathological changes. Some old as well as fresh lobular pneumonic foci show in the lower left lobe of the lung, but are more marked in the right lower lobe.

The eyes were laid free from above, a section was made in the plane of the equator, and the posterior halves of the bulbi were removed with the optic nerves attached to them. The retinæ seem somewhat opaque in the papillary region, and there is congestion of the retinal vessels. No distinct swelling of the papilla.

The brain-substance was immersed in Müller's fluid and alcohol, and a number of sections were made by Prof. Marchand through the focus of the disease, when more was seen touching the extent of the affection, even without the aid of the microscope. These appearances are essentially the following:

1. Section directly above the pons through the crura cerebri

and corpora quadrigemina. Both crura seem unchanged in their substance, except at the edges, where the tumor encroaches slightly but superficially.

2. Cross-section through the pons, about the middle of its height, passing through the crura cerebelli ad pontem, about 0.5 *cm* under the exit of the trigeminus. The section corresponds very nearly to the original made in the fresh state, but the surface had to be trimmed off a little in the interest of a smooth section.

The pons appears very much thickened. Diameter antero-posteriorly 3.5 *cm.* Width at the cerebellum 4.7. The principal point of thickening is at the anterior portion; the posterior, measuring about 1 *cm*, being without perceptible change. The microscope also corroborates this. The anterior section of the pons measures antero-posteriorly about 3.5 *cm;* this region is then subdivided into a posterior part about 1.2 *cm* thick, which shows no recognizable change (the transverse fibres of the pons are distinctly visible), and an anterior portion, which is infiltrated by the mass of the tumor.

The fasciculi of the pyramids are still distinctly limited, especially in the left half; on the right they disappear anteriorly and towards the middle into the infiltration. The mass of the tumor forms irregular, knobby prominences upon the surface. (Fig. 1.)

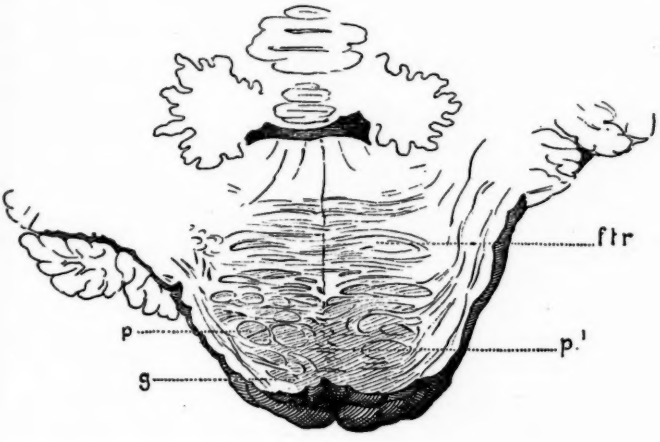


FIG. 1.

3. Transverse section about 1 *cm* under the foregoing, but somewhat more oblique, passing downwards and backwards. On the left the section passes through the origin of the facial and acoustic nerves; on the right it goes through a little higher. The greatest width of the pons is 4 *cm*. The infiltration by the tumor takes in the whole anterior division of the pons, in the middle line, to a depth of 1.6 *cm*. In addition to this there appear near the middle, prominences $\frac{1}{2}$ *cm* thick, before mentioned as enclosing the basilar artery. The fasciculi of the pyramids are swallowed up symmetrically and pretty completely on both sides; here and there an occasional trace of lighter transverse fibres. The round bundles of the pyramids are thickened very much and barely indicated. The sides of the swelling posteriorly reach very near to the exit of the facialis. (Fig. 2.)

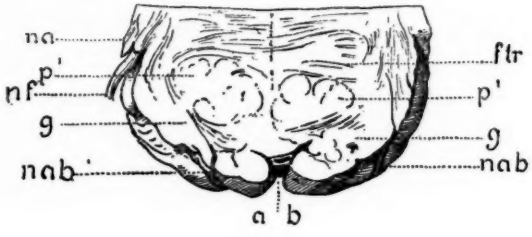


FIG. 2.

4. Section about 0.5 *cm* under the preceding and about as far above the lower edge of the pons. (Fig. 3). At the right it cuts

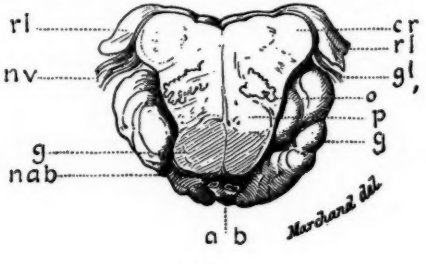


FIG. 3.

right under the origin of the acoustic and facial. The posterior division of the pons appears normal for about 1 *cm;* the entire anterior division is extremely swollen; the section is 3.2 *cm* wide,

by 2–7 *cm* diameter in depth. The contour is broken up by tumor-like proliferations, which form a swelling more than ½ *cm* thick immediately before the origin of the acusticus. The facialis and acusticus, however, in their course, as well within as without the pons, seem unchanged. In the anterior division there are still a few arched fibres, to be seen indistinctly. The bundles of the pyramids are very indistinctly accentuated, and the surface of the section gliomatous throughout its extent. In the right half of the anterior division of the pons, in the immediate vicinity of the N. abbducens, at which point it is quite near the surface, is seen an extravasation of blood, of dark reddish-brown color, and 7–8 *mm* in diameter. On the right side the abducens is grown over by the knobby prominences upon the surface; its substance is not, however, infiltrated. On the left side it lies free.

5. Section at the beginning of the medulla close to the lower border of the pons. (Fig. 4.) The medulla is greatly enlarged, an-

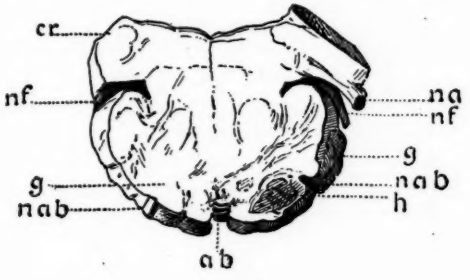


FIG. 4.

tero-posteriorly, 2.2 *cm*, in the middle. The greatest width posteriorly, in the region of the restiform bodies, is 2.5 *cm*, anteriorly, near the olives, 1.9 *cm*, and in the neighborhood of the pyramids 1.5 *cm*. The whole posterior section including the olives is without change, while the anterior portion is occupied by a mass —1.2 *cm* in thickness; this is not distinctly separated from the fasciculi of the pyramids, except on the left, where an arched boundary line is recognizable, about 8 *cm* behind the anterior contour.

The abducens, at its beginning visible on the left side of the section, runs between the lateral knobby prominences, through which its fibres may be followed to a certain extent. At the right its origin is not so evident.

For the microscopical sections, parts were taken from the region of section 2 and lower down, also portions of the medulla, directly under section 5. These sections were treated partly by Weigert's Copper-Hæmatoxylin method and partly by picro-carmin; then imbedded in celloidin and carefully cut. Other smaller sections were prepared from the different parts of the seemingly normal substance, as well as from the diseased pons and medulla.

Microscopic sections through the whole medulla, close under the last described section, show, as a whole, similar appearances. The deep diameter is much greater, owing to the mass of the tumor hanging over the anterior border of the pyramids, but behind the tumor is distinctly separated from the pyramidal tracts by a thin layer of loose connective tissue, so that in the colloidin preparations the mass of the tumor may be easily detached from the pyramidal substance. The pyramids are somewhat flattened and slightly broader, but show no trace of the substance of the tumor. That portion of the tumor which projects over the pyramids anteriorly (from above, or rather from the lower border of the pons) has a thickness of 5–6 *mm.* The roots of the hypoglossus pass beneath this proliferation and make their exit laterally. The preparations, stained by Weigert's method, from the upper part of the pons, which include the greater portion of the entire anterior region, show the progressive infiltration of the nerve substance most distinctly. The fasciculi of the pyramids show themselves as round figures (corresponding to the macroscopic appearances), somewhat more distinctly on the left side, the boundary lines of which anteriorly gradually disappear in the homogeneous infiltration. The transverse fibres, also, are still recognizable, but are more and more indistinct anteriorly, and are wholly separated from each other by the substance of the tumor. At almost every point, however, they are still recognizable with the microscope as fine black lines, grouped in large bundles, which become more isolated as the anterior periphery is approached. In the cross-sections of the fasciculi of the pyramidal tracts, the nerve filaments are seen as small black points, so scanty, however, in the posterior fasciculi, that only a blackish coloration is evident to the naked eye. The preparation, for the most part, shows a yellowish-brown color.

The tumor is moderately vascular, and is composed of numerous small round cells crowded together so thickly that they can hardly

be isolated. The parts of the posterior divisions of pons and medulla oblongata, which appear unchanged macroscopically, also present nothing abnormal under the microscope.

The spinal column was not sufficiently well preserved for delicate examination; but there was no noticeable appearance of secondary degeneration in the pyramidal tracts. According to this, there existed a diffused gliomatous degeneration of the whole anterior section of the pons, advancing probably into the neighborhood of the fasciculi of the pyramids, or into the pyramidal tracts themselves. The mass of the tumor developed anteriorly as well as laterally far beyond the normal limits, and destroyed the pyramidal tracts in the pons, as far down as its lower border, while they escaped unmolested upon passing into the medulla. The fibres of the commissure in the anterior section of the pons were destroyed, while the greater part of the latter remains untouched. In fact the whole posterior sections of the pons and medulla, with their collections of gray matter, nerve nuclei, and outgoing nerve fibres, were not included in the ravages caused by the tumor; the abducens nerve, alone, seems to be the only one to have been directly affected in its course through the medulla, as well as at its exit. The other nerves appear only to have suffered from the pressure of the tumor at their origin.

The disease began, as reported, with paralysis of the right abducens, subsequently followed by that of the left, while the right eye became somewhat more movable;—the paralysis on the left side, however, varied in the same manner. Incidental to this, pain and vertigo. About two and a half months after the beginning of the affection, the disturbance of speech (caused by the hampered movements of the tongue) and slight paresis of the lower facial region became pronounced, and now the gait is somewhat unsteady. All these manifestations, however, were subject to variations, but as a whole they increased gradually; the spastic gait became more pronounced, with increase of the patellar reflexes; likewise, the disturbance of swallowing was more marked, accompanied by closure of the mouth. Finally, at the end of the fourth month, there existed complete paralysis of the muscles of the back, extremities, and face, except the orbicularis, and those muscles supplied by the motor

oculi and trochlear nerves. This was accompanied by spastic stiffness of the muscles of the extremities. There was no wasting of the extremities or tongue, and they remained responsive to both the constant and induced currents. This course might, according to this, indicate disease of the nerve nuclei, with implication of the lateral pyramidal tracts. It was impossible to determine whether polioencephalitis was present (as would seem to be indicated by the somewhat rapid progress), for the same symptoms might be produced by the development of a tumor acting either directly or by pressure upon the nuclei, as has been recently demonstrated by one of Uhthoff's[1] cases, in which complete ophthalmoplegia externa was caused by a solitary tubercle, of the size of a hazel-nut, situated in the medulla oblongata. Still, it seemed remarkable, considering the long duration of the disease, that there was no choked disc, the absence of which seemed to militate against the existence of a brain tumor. We know, to be sure, that disease of the optic nerve may also be wanting in tumor of the brain, but this is rare where the neoplasm is large and of rapid development.

Finally, a few days before the end, the ophthalmoscope showed traces of a beginning intraocular optic neuritis. In both eyes, the papilla and retina below the entrance of the optic nerve were somewhat hazy, and a congested pulsating vein was noticed in the right eye extending beyond the papilla, and in fact the microscope showed these appearances to be the beginning of choked disc.

The posterior halves of the eyes were hardened in Müller's fluid and alcohol. The optic nerves attached to these halves showed a moderate distention and looseness of the sheath, which was slightly movable in the neighborhood of the globe. The preparations were first imbedded in paraffine and longitudinal sections were then made transversely through the papilla optica and the adjoining part of the optic nerve, while nearer to the brain cross-sections were made, together with teased preparations. These were stained with carmine, borax-carmine, hæmatoxyline,

[1] Tageblatt der 59. Versammlung deutscher Naturforscher und Aerzte, 1886, S. 156.

chloride of gold, and analine dyes. It was noticed, especially in cross sections, that the interstices between the bundles of nerve fibres and the connective-tissue reticulum seemed larger than they are usually seen ; these latter were partly empty, and partly filled with a transparent mass, broken up into figures of manifold shapes. Sometimes isolated swollen fibres of connective tissue were seen passing over from the principal stroma, through the interspaces into the nerve bundles. The connective tissue stroma surrounding the vessels was, for the most part, separated from the neighboring nerve bundles and partly frayed out. The peripheral parts of the optic nerve showed fewer interspaces, but the pial sheath was detached from the nerve bundles in several places. These changes could be followed as far back as the entrance of the vessels into the optic nerve ; they were however rarer and less marked in the tract between the cerebrally situated entrance of the artery and the more peripheral location of the vein. Still nearer to the optic foramen, they were so rare that they could not be distinguished from the ordinary spaces which appear in such sections. The calibre of the art. centralis was unchanged and fairly round, while that of the vein was slit-shaped. Between the external fibrous sheath of the optic nerve (upon which the dural sheath, separated for the most part from the arachnoidal sheath, was easily distinguished) and the pial sheath, especially near the globe, there existed a wide space, traversed by the connecting bands, some of which were covered with small round cells. The endothelium of both sheaths was quite distinct ; there was no proliferation of the nuclei. Even in the optic nerve itself, there were no traces of pathological increase of the cells. The section through the papilla showed the network of the lamina cribrosa, which passed straight across the nerve, without the pronounced concavity seen normally. In the papilla itself were seen transparent interspaces between the separated nerve fibres, giving the peculiar sponge-like appearance described in detail by Rosenbach.[1] No proliferation of nuclei, aggregations of cells, or hemorrhages are to be seen here ; likewise, there is no considerable vascular development. Several of the largest veins are congested with blood, but in other preparations they are quite empty. Many of the nerve fibres showed the well known ganglionic thickening ; these were even seen isolated in the lamina cribrosa. They were

[1] *v. Gräfe's Arch.*, Bd. xv., Abth. 1.

likewise seen in different parts of the adjoining nerve substance of the retina, but were isolated, not arranged in nests, and of very varying size. This change probably accounts for the haziness noticed with the opthalmoscope. Great congestion of the retinal vessels is also seen; several isolated capillaries, running traversely through the fibrous layer, almost perpendicular to the ganglionic layer, are especially remarkable.

There were no other changes of the retina. The papilla can hardly be regarded as especially swollen; the thickness of the layer of nerve fibres at the hole in the choroid is 0.41 *mm.* The central excavation, at the point of exit of the blood-vessels, is well preserved.

According to this examination, besides the moderate enlargement of the subvaginal space, the principal pathological changes are œdema of the ocular end of the optic nerve and of the papilla, and the ganglionic change of the optic-nerve fibres. Hyperæmia and stasis were less pronounced. This about corresponds with the appearances described by Ulrich[1] last year, but in my case the venous stasis is not so pronounced, partly because my examinations were made at an earlier period and partly because of the non-extension of the œdema to the more central parts of the optic-nerve stem. The ganglionic change of the nerve fibres is due to the swelling of the axis-cylinder in the increased lymph fluid (Rumpf, Kuhnt), and it seems to me that this case, dissected at an unusually early period, since no inflammatory symptoms were present, may be advanced in support of my so-called "Transport-Theorie," according to which the subdural or subarachnoidal fluid is forced out of the skull into the subvaginal[2] space, which it distends, and leads to œdema of the lamina cribrosa. This latter condition first causes venous stasis by pressure on the vessels, and later on may give rise to inflammatory processes, due to the damming up of the arterial supply of the blood. This view has received substantial support from the experiments of Manz, and more recently from those of Schultén, to-

[1] *Arch. f. Augenheilk.*, Bd. xxvi.

[2] Even if, in opposition to Quincke, we accept the theory of a lymph current running from the subvaginal space *to* the brain, the increase of intracranial pressure would cause stasis within the sheath.

gether with clinical and pathologic-anatomical observations. Leber, and also Deutschmann in his last exhaustive work,[1] have modified this somewhat by supposing all cases of "choked disc" to be of an inflammatory nature. According to the above authors, germs pass into the sheath of the optic nerve from the cavity of the cranium, which excite inflammation and cause papillitis. It may, however, here be objected that although older cases of "choked disc" of longer duration, such, for instance, as those communicated by Deutschmann, may be here included,—may be without doubt referred to inflammatory processes, the symptoms of œdema and hyperæmia undoubtedly predominate in the beginning. To be sure these are more often verified by the ophthalmoscope than by the autopsy. I have often had occasion to observe the commencement of "choked disc." At first a slight haziness of the tissue and venous stasis is observed, and later on pronounced swelling, which is often recognized to be essentially œdematous, owing to its remarkable transparency. The unilateral pulsation of a dilated vein, which was especially interesting in the present case, was verified before death, and is easily explained by the interference with circulation in the œdematous connective tissue of the lamina cribrosa and adjoining optic nerve. Other observers have also described similar appearances in the first stage of "engorged papilla." Knapp,[2] for instance, found the papilla and surrounding region "hyperæmic and œdematous"; Ulrich,[3] "papilla slightly reddened, borders somewhat hazy, more marked left, still possibly physiological on both sides; the veins seem greatly congested." It would be easy to add to these examples. Of course it is seldom that we have an opportunity of making an anatomical examination at such an early stage, when inflammatory phenomena are not yet present. Such cases exist, however, and Deutschmann himself cites those of Iwanoff, Herzog, Pagenstecher, Rosenbach, Treitel, and Ulrich. He utilizes these cases in

[1] Ueber Neuritis Optica, besonders die sog. Strauungspapille und deren Zusammenhang mit Gehirn-Affectionen, 1887.

[2] Tageblatt der Strassburger Naturforscher Versammlung, 1885.

[3] Ueber Stauungspapille und Oedem des Schnervenstammes.—*Arch. f. Augenheilk.*, Bd. xvii., S. 34.

order to emphasize and render prominent alterations which seem to him to be due to inflammatory changes: collections of lymph corpuscles, for instance, which might quite as well be due to venous stasis; or the sclerotic thickening of the nerve fibre, which, as above mentioned, may be referred to the action of the œdema. Deutschmann also does not believe that Ulrich's results, showing wide interspaces between the nerve bundles and the connective-tissue reticulum, prove the existence of preceding œdema, but thinks that these appearances may be caused by the treatment with celloidine. This is true to a certain extent, and will always antagonize the microscopic diagnosis of œdema. Comparison with normal sections treated in the same manner would probably decide the matter in favor of Ulrich. Teased sections in Rosenberg's case of "choked disc" likewise showed œdema of the papilla; a fine grayish homogeneous substance similar to coagulated lymph was found in the network. Rosenberg's statement that the ocular part of the optic nerve in fresh condition was found to be "softened," without noticeable micropic deviation from the normal, is especially interesting, as perhaps there was a partial development of myeline granules in the nerve fibres.

The real commencement, therefore, of choked disc is to be regarded as an œdematous infiltration of the ocular part of the optic nerve, and not as an inflammatory process. If, as Deutschmann maintains, choked disc "is due to the influence of inflammatory germs passing out of the cavum cranii into the sheath of the nerve, with the cerebro-spinal fluid," why do not the other nerves and parts of the brain which are permanently immersed in this infecting fluid, show inflammatory changes? The appearance of inflammation after the choked disc has existed for some time is explained by changes in the arterial blood supply, or it may be that the œdema and interference with the nutrition of the surrounding tissues prepare a favorable breeding-ground for any germs which may happen to lodge there. Deutschmann injected the subdural space with a solution of agar-agar, and in spite of permanent distention of the sheath of the optic nerve with the fluid, he found no symp-

toms of choked disc, with the exception of changes in the vessels. I think this was due to the fluid used, which coagulates very quickly and is not likely to find its way through the fine spaces of the pial sheath of the optic nerve and the lamina cribrosa.

The theory of œdema of the lamina, however, is especially dependent upon this communication between the subvaginal space and the lymph spaces of the lamina cribrosa. Schwalbe thinks that my successful injection of the lamina cribrosa from the subdural space of the cavity of the cranium, was due to the fact that, in some cases, the resistance to the penetration of the fluid into the pial sheath is not so great as in others. This may be so, but, at any rate, these communications exist, as is shown by injections under the pial sheath in the neighborhood of the lamina cribrosa: the whole transverse section of the latter is seen to be filled; the mass is also seen passing out through the pial sheath into the subarachnoidal space of the sheath of the optic nerve (Schwalbe, Wolfring). In fact, Deutschmann *did* produce a real, non-inflammatory choked disc, by injection of the subvaginal space of the rabbit, although this was attained by a greater over-filling of the space than has ever been observed in man. I think, however, that such excessive conditions are not at all necessary to produce the same effect. A moderate but slow increase of the fluid in the subvaginal space, which is more prone to accumulate at the ocular end (as our pathologico-anatomical observations have shown us), owing to the frequent changes of pressure in the subvaginal space caused by the movements of the eye, would certainly be followed by oozing and penetration into the lymph space of the lamina cribrosa, through the existing openings. It may be quite appropriately mentioned here that the downward convergence caused a searing or dragging of the scleral insertion of the optic nerve [whether by direct action of the superior oblique (Stilling), or by the contraction of the internal rectus], which is transmitted to the accumulation in the subvaginal space, and the pressure upon the fluid in the tense sheath is increased. This higher pressure is not compen-

sated for at once, because the interstitial tissue of the intervaginal space offers an obstacle to the recession of the lymph to another part of the sheath of the optic nerve. Movements of the eye must therefore facilitate the passage into the lamina, even without permanent and absolute tension of the sheath. Hence it does not seem remarkable that in choked disc due to encroachments upon the intercranial space, an *excessive quantity* of fluid (a so-called hydrops vaginæ nerv. optici) in the subvaginal space should be wanting. However, the post-mortem appearances by no means determine the condition during life. It should also be remembered that, in addition to the possibility of the post-mortem escape of the lymph when the optic nerves are severed, the œdematous infiltration, which was distinctly seen to be present in life, may disappear after the death of the patient. There is even very little left of the normal cerebro-spinal fluid. Especial weight should be laid upon the degree of looseness or movability of the external fibrous (dural-arachnoidal) sheath upon the inner one, as it is of great importance to the diagnosis of an *intra-vitam* increase of the subvaginal fluid, since it denotes an enlargement of the intervening space between the external and internal sheath. I have verified this remarkable movability in all autopsies of brain tumors accompanied by choked disc at which I have assisted, although it is impossible, in certain cases of moderate looseness of the sheath, to definitely draw the line between the physiological and the pathological condition, just as is true of moderate accumulations of fluid in the sheath. With regard to this, however, I discovered a similar appearance in only one of twenty-two eyes belonging to individuals of different ages, which had been hardened in Müller's fluid, and which were *not* affected with choked disc, while I have always found this change, but more marked, as a rule, in all eyes that *were* so affected. In addition to this the optic nerves in question were cut off quite short and torn in a longitudinal direction.

Cases of excessive atrophy of the optic nerve and extreme myopia, in which the sheath is also loose and the subvaginal space enlarged of course, are not considered in this connection.

I cannot, therefore, accept the absence of pronounced hydrops intervaginalis at the autopsies of different cases of choked disc, as a convincing objection to the correctness of the transport-theory. Ulrich, however, in his last paper, returns to Parinaud's view of the passage of the œdema directly from the brain through the trunk of the optic nerve. I think he is wrong. In the first place, there is often no œdema of the brain at all, as, for instance, in the case cited in the preceding pages. More than this, and this seems to me not less important, there is no trace of œdematous infiltration in the majority of cases in those parts of the optic nerve farthest removed from the eye; moreover, the late secondary changes have their principal site in the papilla, and gradually disappear towards the brain. Ulrich himself reports a quantitative decrease of the œdema as the optic foramen was approached. In my case, this was not verified beyond the entrance of the vessels. Also in another case of advanced choked disc, which was examined after Ulrich's paper was published, I could find nothing of the kind. This agrees with the results obtained by most other authors. I believe, consequently, that this proves sufficiently well that the bulbar part of the optic nerve is the point of outflow of the œdematous infiltration. In our patient, the beginning of the choked disc was relatively late; without doubt due to the very gradual development of the intracranial pressure. This is corroborated by the clinical absence of intense symptoms of pressure. Perhaps the site of the tumor at the foramen magnum also hindered the free communication with the spinal fluid, and thus limited the supply from this source. (Quincke's experiments show that this supply is physiological.) There was undoubtedly excessive narrowing at this point, as is shown by the pressure upon the hypoglossus and vago-accessorius, thereby causing the bulbar paralysis.

As shown by section and further observations of my colleague, Dr. Marchand, the nuclear region in the floor of the fourth ventricle and the central nerve fibres were not attacked by the tumor, and the abducens nerves were only directly affected at their exit from the brain; the most

damage was done to the pyramidal tracts. The paralytic symptoms were very variable (as is, however, often seen in tumor of the brain), although the disease was non-nuclear.

Nuclear paralyses have been regarded with great interest recently, and I have no doubt that many cases of ophthalmoplegia, which have been mistaken for this condition, have afterwards proved to be only pseudo-nuclear paralyses. Even the uncomplicated exterior ophthalmoplegia where the fibres of the motor oculi supplying the muscles of accommodation and the iris retain their function (which is regarded by Mauthner as a certain evidence of the implication of the nuclear region), according to Moebius,[1] may be of peripheral origin.

In conclusion, I would like to call attention to the change in the pupils which I have often noticed on the cadaver, and which was also present in this case. Although both pupils were symmetrically contracted just before death, at the autopsy (thirty hours after death) the left one was moderately dilated, while the right was remarkably contracted. After the right eye had been halved for the purpose of securing the preparation, myosis made its appearance. Marshall,[2] to whom we are indebted for a detailed investigation of this point, also noticed that the post-mortem contraction of the right eye is often more marked than that of the left. He was not able to assign a cause for this. Closing the eyes did not change the result.

### *Explanation of the Cuts.*

See text for the different sections. *g* = gliomatous mass; *p* = pyramidal tract; $p^1$ = infiltrated pyramid bundles; *ftr* = transverse fibres of the pons; *o* = olives; *cr* = corpus restiform; *na* = n. acusticus; *nf* = nerv. facialis; *nab* = n. abducens; *nv* = nerv. vagus; *ng* = n. glossopharyngeus; *ab* = art. basilaris.

[1] *Centralbl. f. Nervenheilk.*, 1886, No. 27.
[2] *The Lancet*, 1885, S. 286.

# TOTAL CONGENITAL STAPHYLOMA OF THE CORNEA WITH DERMOID FORMATION.

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(*With one plate, Tab. iii., of vol. xviii., Germ. ed.*)

Translated by John E. Weeks, M.D., New York.

In August, 1885, Christina S., of Vierfeld, aged six months, was brought to the clinic on account of a congenital malformation of the eye. The left eye was normally developed in all its parts. The lids of the right eye were separated by the protrusion of two tumors, each about the size of half a cherry. By a more complete separation of the lids the cornea appears to be almost entirely covered by the two tumors; (Tab. III. fig. 1.) however, above and below, between their bases, a triangular space, measuring 2–2½ *mm* at the base, remains free. The bases of the tumors are not united; between them appears a narrow band of clear corneal tissue, which unites the apices of the two triangles. The tumor at the inner side is about two thirds larger than the outer one, and consequently projects further forwards. Towards the sclerotic the tumors become flattened out and pass imperceptibly into that membrane, while on the cornea their walls are relatively abrupt. The tumors do not appear to lie on the cornea, but to pass into corneal and scleral tissue. In color and general appearance they resemble the integument; close inspection with a lens shows marked unevenness of the surface; the tension of the eyes is nearly alike.

At the root of the right ala of the nose is another tumor,

which is somewhat larger than a pea, and is soft in consistence. Examined under an anæsthetic, the tumor is found to be a valve-like covering to the opening of a very small canal through which a very fine sound can be passed. The sound passes obliquely upwards and inwards for about two inches, causing the child to move as though it would sneeze. A sound passed through the right external meatus of the nose comes in contact with the first sound, indicating that the small canal opens into the nasal cavity. The sounds cannot be felt by passing the finger into the mouth.

It was agreed to enucleate the eye in the fall.

The child was next seen on February 2, 1886, at which time the tumors were found to have increased in size; they lie against each other, seeming to pass one into the other There is but very little clear cornea to be seen. The surface of the tumors is reddened, the conjunctiva produces a copious secretion, and the border of the under lid is excoriated by the overflow of tears.

The palpebral fissure was enlarged to permit the passage of the globe, and the eye was enucleated. The tumor on the ala of the nose was excised at the same time.

Healing normal.

After hardening in Müller's fluid for a few weeks, a horizontal section of the globe was made, one half was washed in water, the hardening completed in alcohol, embedded in celloidin and sections were made with the microtome.

In the longest diameter the globe measured 26 *mm*; width, 20 *mm*.

Macroscopically, it is evident that the tumors described *intra vitam* could not be regarded as such, but were simply staphylomatous protrusions of a thickened cornea with total adhesion of the iris. The lens occupies its normal position, and the vitreous is uncharged. Microscopical examination of the sections shows, at first glance, that, instead of cornea, the anterior portion of the globe is composed of integument. (See fig. 2, and its explanation at the end of this paper.) From the periphery towards the centre the epithelium gradually increases to two or three times the normal thickness, forming papilliform projections in places.

The outer layers resemble the horny layers of the epidermis. In some parts numerous epithelial processes project into the subepithelial tissue. These processes alternate with hair bulbs, part of which are perfectly and part imperfectly developed; from these bulbs well-formed or rudimentary hairs project above the level of the epithelium. In some places a hair bulb, with its accompanying well-developed sebaceous glands is encountered. Closely packed bundles of connective tissue, having a course nearly parallel to the cut surface, pass between the epithelial processes and the hair bulbs. Large and small round cells are found in the connective tissue, either heaped together or formed in long rows which frequently divide. Capillaries cut transversely or longitudinally are met with in many places. In every section a place is seen, near the anterior pole of the globe, small in some, larger in others, which is recognized as corneal tissue, and in which some scattered round cells are found. The connective tissue passes imperceptibly into corneal tissue on both sides. The place in which this corneal tissue appears indicates the location of the division line between the two tumors previously mentioned. The epithelial layer over this part is not so thick; no hairs are present, and there is but little evidence of the formation of papillæ.

From the centre of the pseudo-cornea towards the periphery the connective tissue loses its density. The bundles become separated and form larger and larger spaces, which are filled with adipose tissue—analogous to the integument. At the centre there is no adipose tissue, but in places the connective tissue is not very dense. This is particularly the case in the inner layers of the pseudo-cornea; here the tissue is very loose, and is rich in round cells, which are collected in large clusters. This tissue, which in general resembles the integument, is on its inner surface covered by a thin pigment layer, which extends from the ciliary body on one, to the ciliary body on opposite, side. This is the pigment layer of the iris, which covers the entire posterior surface of the pseudo-cornea, and is united with it in the greater part of its extent. Not much is to be seen of iris

stroma, but between pseudo-cornea and pigment layer there exists a very thin membrane which is unmistakable iris tissue. This tissue is more characteristic and wider in the places where the iris is not adherent to the pseudo-cornea (see plate). The pigment layer is continuous over the rather prominent ciliary muscle and the normally developed ciliary processes. Over nearly the whole extent of the pseudo-cornea, lying between it and the iris tissue, united to the latter in many places, Descemet's membrane is seen. It is present throughout, and in certain places shows a layer of well-formed nucleated cells; this is particularly the case in a part near the anterior pole of the eye when the iris tissue is separated from the cornea. At this place sections of a number of nearly concentric layers of Descemet's membrane are seen (appears to be rolled up); some are cut obliquely, showing the flat surface of this membrane. The hyaline layer corresponding to this place has disappeared from the pseudo-cornea, but is seen again a little before the second space between cornea and iris tissue is reached, and from this point can be followed to the periphery. Schlemm's canal, the ciliary muscle, ciliary processes, and the zonular fibres, which are in part isolated, are well developed. The lens shows nothing abnormal and is in its normal position.

By microscopical examination of the posterior portion of the eye the vitreous appears to be normal; the sclera is of normal thickness. The choroid and retina are normal in all of their parts. The layer of rods and cones is particularly well preserved.

While the sheaths and subvaginal space of the optic nerve show nothing abnormal, the nerve itself is markedly atrophic. This condition is brought out very distinctly by Weigert's method of staining. Even by the hæmatoxyline stain, the bundles of nerve fibres appear smaller and are traversed by connective-tissue fibres. This is most marked at the centre of the nerve. At the periphery the nerve bundles and fibres are relatively well preserved. By Weigert's method there is no staining of medullary substance towards and at the centre of the nerve, and at the periphery there are only

small bundles of faintly stained medullary nerve fibres. The papilla is not excavated. By the usual methods of staining the nerve-fibre layer of the retina does not appear to be changed.

The change in the posterior portion of the eye is confined to a partial atrophy of the optic nerve.

The above-mentioned tumor at the root of the right ala of the nose, was cut into sections. The principal part of the tumor is composed of loose connective and adipose tissue. From the centre toward the periphery the fatty tissue diminishes and the connective tissue increases in amount; round cells are scattered throughout. The outer surface is covered with integument, the under surface with mucous membrane. The transition from integument to mucous membrane is imperceptible. Towards the mucous surface we find three (two large and one small) groups of gland tissue which are macroscopically visible. The glands are of acinous formation, the acini being arranged close to each other, and are of the type of the salivary glands. In many of the microscopical specimens transverse and longitudinal sections of the ducts are visible, in the lumen of which, occurring at intervals, white mucous drops and œdematous epithelial cells are seen, much as they appear in the cysts of mucous glands.

But to return to our eye. The dermoid character of the tumors is established by the microscopical examination. Dermoid formations are not infrequently met with in malformations of the eye. Nevertheless, it has appeared best to report this case, for the purpose of enriching our literature on the subject; not so much in regard to the histological formation, the anomalies in which are seldom greater in any single case, as on account of the accessory condition, the topography of the sections, and the somewhat complicated etiology of the case.

The microscopical examination of dermoid tumors of the eye, described by v. Gräfe,[1] Ryba,[2] Virchow,[3] Heyfelder,[4]

[1] v. Gräfe, *Archiv f. pathol. Anatomie u. Physiologie*, Bd. vi., 1854. *Archiv f. Ophthal.*, Bd. i., Abth. 2, 1855.
[2] Ryba, *Prager Vierteljahresschrift.*, Bd. iii., 1853.
[3] Virchow, *Archiv f. pathol. Anatomie*, Bd. vi., 1854.
[4] Heyfelder, *Deutsche Klinic*, No. 28, 1858.

de Wecker,[1] Linati, C. and Visconti Achille,[2] Strawbridge,[3] Hirschberg,[4] Fuchs,[5] Van Duyse,[6] Vassan,[7] and F. Labouret,[8] relate only to circumscribed larger or smaller tumors, which, singly or in twos or threes, were situated on the cornea, the sclerotic, or on both. The growths never extended over the whole anterior portion of the uveal tracts; in many cases after an operative procedure (levelling off with subsequent formation of artificial pupil) a more or less useful eye remained.

It was much different in our case. It could be determined macroscopically that the dermoid tumors did not rest on the cornea and sclerotic, but passed into—included these tissues. The opinion was substantiated by the microscopical examination. Of true corneal tissue but very little was to be seen in any of the sections; it had given place to connective and adipose tissue and to the other parts of true skin. Only Descemet's membrane was present throughout the whole extent of the pseudo-cornea, but it was not intact. The iris, which in none of the reported cases was greatly changed, is rudimentary here, and throughout the whole of its extent is more or less firmly adherent to Descemet's membrane and the subjacent tissue. As above remarked, all sections show that Descemet's membrane is wanting in one place; at this place the borders of the membrane appear to be rolled up. From the existing condition it is safe to assume that the embryonic cornea perforated and that total staphyloma of the cornea followed.

Regarding the production of dermoid tumors in general and the dermoid formations on the eye (see de Wecker, Ryba, Kraske, Michel, and others), Van Duyse, in opposition to the above authorities, has propounded an hypothesis by which he endeavors to show that these malformations, together with congenital tumors of the throat, coloboma of

[1] de Wecker, *Traité compl. d'Ophthal.*, vol. i., No. 1, 1878.
[2] Linati, Carlo e Visconti Achille, *Ann. d'Oculist.*, Bd. lvii.
[3] Strawbridge, *Amer. Jour. of Med.*, January, 1872.
[4] Hirschberg, *Archiv f. Augen- u. Ohrenheilk.*, Bd. iv., 1, 1874.
[5] Fuchs, *Zehender's klin. Monatsbl.*, No. 18, 1880.
[6] Van Duyse, *Annales de la Soc. de Méd. de Gand*, 1882.
[7] Labouret, *Thèse de Paris*, No. 203, 1885.
[8] Vassan, *Arch. d'Ophth.*, vol. iii., No. 1, 1880.

the eyelids, etc., are only the remains of early adhesions (synechiæ) between the inner layer of the amnion and the surface of the embryo. How and why such synechiæ should form is an open question, and will probably remain so; but this does not make the hypothesis less tenable.

Apparently such synechiæ could only originate during that period of embryonic life before the amniotic fluid has begun to form, that is, during the first two or three months, —before the eyelids are fully developed. In the third month the palpebral fissure is still so wide that the cornea is almost entirely exposed; it closes during the fourth month. The lids therefore do not prevent early adhesion between cornea and amnion. By the accumulation of amniotic fluid the synechiæ may be broken at any time before the development of the lids has advanced far enough to cause closure of the palpebral fissure (three months); the fragment of amnion remaining attached to the point of union on the globe develops into an epibulbar dermoid tumor. Coloboma of the lid, which frequently accompanies dermoid formations on the globe, may be accounted for by supposing a later separation of the band of adhesion. This theory, however, is not sufficient to completely explain the etiology of the above case. A review of the literature on dermoid formations teaches that these tumors rest on the cornea or sclerotic, as the case may be, and that they may be removed without destroying the cornea and iris.

It is a question whether the above-described condition can be explained by the dermoid formation alone. The rupture in Descemet's membrane and the complete adhesion of the iris would suggest an intra-uterine perforation of the cornea. The rupture and rolling in Descemet's membrane alone would not necessarily bear out this view, since cases of rupture of Descemet's membrane without perforation of the cornea are known, as resulting from pronounced ciliary and intercalar staphyloma (O. Becker [1]), and accompaning great stretching of the cornea in rapidly

[1] O. Becker, Atlas der pathol. Topographie des Auges. Zweite Lieferung, Taf. xviii.

developing glioma (da Gama Pinto).[1] It is possible that in this case the staphylomatous bulging of the anterior part of the globe was the result of the rupture of Descemet's membrane simply; however, it is difficult to explain the condition of the iris without supposing a perforation of the cornea to have taken place. It is well known that, in the embryo, the iris is close to the cornea, and that an inflammation of the latter could easily be communicated to the former and lead to extensive adhesions between the two. It may be supposed that traction from two synechias by the rapid formation of amniotic fluid has produced a secondary inflammation at the place of attachment of the finally broken bands, and has weakened the newly formed cornea. There is nothing to combat the opinion that the inflammation extended to the iris, which on account of its proximity to the inflamed cornea became extensively adherent to it. The bulging of the changed and weakened cornea is accompanied with the iris tissue, partly agglutinated, partly thinned, while the structureless, less elastic Descemet's membrane has ruptured.

In this manner the assumption of a perforation could be avoided, which would be the more desirable, as it has already been stated, that the rupture of Descemet's membrane occurred at the point where corneal tissue can yet be made out. If the place of the rupture were found in some part of the dermoid tissue, it would seem more plausible to assume a perforation. It might then be supposed that at the point where the largest synechia was formed, through increased traction the cornea became very weak and thin and so led to a rupture or perforation.

Although the former explanation of the cause of the condition is the more plausible, we may briefly allude to another.

It is a well known fact that in enbryonic life pathological changes take place, the etiology of which cannot be determined; at least the observations of congenital cicatrices of the cornea, partial and total staphyloma, and similar conditions indicate this. Although the etiology of this case

[1] Da Gama Pinto, Intravoculare Tumoren, S. 75, Bergmann, 1886.

is not simplified by the introduction of another factor, it should be kept in mind that the formation of synechiæ may have been preceded by a severe enbryonic keratitis, which has led to perforation of the cornea with extensive changes and adhesions in the iris. Synechiæ may readily form between the amnion and the inflamed and ulcerated cornea, after which the dermoid tumor may be developed. The appearance of the total staphyloma may be explained by supposing the occurrence of such a severe keratitis with ulceration and perforation, and it is plausible in this case to believe that the amnion synechia was formed immediately after the cornea had become ulcerated. It is not to be denied that it is difficult to understand when and how such synechiæ are produced; but if the cornea is diseased and the epithelium is denuded in places, it is then possible that the surrounding membrane of the embryo may grow to the ulcerated surface, and the dermoid growth result.

In conclusion, the question naturally arises as to whether or not all dermoid formations of the eye are the result of pathological changes in the young cornea. It must, of course, first be established that in the early months of embryonic life, before the amniotic fluid has formed, inflamations of the cornea may exist. Then and only then can the cause of dermoid formations be safely referred to the formation of synechiæ.

The hypothesis of the formation of synechiæ is not confined to dermoid formations of the eye. Van Duyse is of the opinion that dermoid formation on other organs are due to the same cause.

Whether in these cases a pathological change at the point affected is to be considered as the first step, is a question that is difficult to answer.

A short reference to the small tumor at the root of the right ala of the nose will suffice.

As above mentioned, the tumor, which was about as large as a pea, was composed of connective and adipose tissue, covered with integument and mucous membrane. It contained a relatively large, three-lobed, acinous

mucous gland, which formed a valvular covering to a small canal communicating with the nasal cavity. The condition is very probably one of congenital protrusion of the nasal mucous membrane, which had developed into a small adenoma containing mucous glands.

### *Explanation of the Figures.*

FIG. 1. Sketch of the right eye and the tumor at the root of the right ala of the nose.

FIG. 2. Anterior section of globe. (On account of a want of space a portion of the lens, sclerotic, and ciliary body of the same side was omitted.) The section is made in the horizontal meridian, where the two tumors pass into each other.

*E.* = Epithelial layer. *H.* = Hair. *Ht.* = Hair with sebaceous glands. *P.* = Papillæ. *Cg.* = Corneal tissue. *Rh.* = Collections of round cells. *Rz.* = Chains of round cells. *Fg.* = Adipose tissue. *Bz.* = Strings or bundles of connective tissue. *K.* = Transverse section of blood-vessel. *O.* = Descemet's membrane. *eD.* = Descemet's membrane rolled in itself. *D.* = Rupture of Descemet's membrane. *Ist.* = Iris stroma rarefied. *Pb.* = Pigment layer of the iris. *Sch. R.* = Schlemm's canal. *S.* = Sclera. *Cf.* = Ciliary processes. *Cm.* = Ciliary muscle. *Zf.* = Zonula fibres. *L.* = Lens.

# A CASE OF GLAUCOMA IN A CHILD.

By Dr. C. H. VILAS, of Chicago.

I TRUST the case of glaucoma I shall herewith submit in detail to the profession may not prove uninteresting, mainly on account of the time of life at which it occurred. I believe it to be unique.

August 4, 1888, Mrs. S., of Massachusetts, brought to my office her child, a bright and frolicsome boy. From her I elicited the following history of the case, which I relate in substantially her own words: "I am an American by birth, and so is my husband. I have never heard of any blindness or eye disease in either my own or my husband's family. My son was born on the 12th day of January, 1883, and, so far as I know, was in every way healthy, being so pronounced by the attending physician. I am certain he showed no defect in his eyes, because he was my first child, and I having had the sole care of him naturally frequently examined his eyes, as mothers do. Aside from the whooping-cough at three months of age, there was never any thing the matter with him until June, 1886, when I called the attention of my physician to an irritation of the child's lids. The physician made a prescription of some kind, but I did not use it, and do not think that difficulty had any thing to do with his present trouble. About a year later, in June or July, 1887, I noticed the pupil of his left eye was enlarged, as you see it in this photograph, which was taken in December following, and it has never resumed its former size. You can see by these other photographs I show you, taken at respectively six, eighteen, and thirty months of age, that there was no trouble with the pupil then. Nothing farther was noticed, and although I intended to take him to an oculist, I dreaded so to do it, I did not. About the middle of last March

he went to bed one night as well as ever, but awakened in the night feverish and complaining of headache. I bathed his head and soothed him, but he was restless, afterward vomiting and complaining of headache and pain in the left eye and over the brow. His eyes were inflamed, and he complained of the light, and wanted it moved. I called it a bilious attack. He lay quiet —almost stupid—the whole of the next day, so unlike him; would n't open his eyes, grew more feverish and wanted all the light shut out. A physician was then called. This attack lasted two days, when he opened his eyes some, but they were badly inflamed, and the physician advised seeing an oculist. Then there was an interval of about a month, when he had another similar attack, though not so severe, the symptoms being limited to the head. He now seemed well, and I thought, as I was advised, that it was all over, though his sight did not seem bright. But about July 4th he had another attack, similar to the first, not so severe, but very persistent. He did not recover so completely as before. I was thoroughly alarmed now, and sought among my acquaintances where to take him for further counsel, the result being that I am here."

I examined the patient carefully, finding the result as below, and at my request his mother allowed others to see the case also. I can give no idea of the difficulty had in making the examination, and the patience required, which must, in a measure, account for my doubtful statements. I have never seen another such child, so frolicsome, so unrestrained, and so forgetful of the previous moment's caution. He cried furiously and instantly on the least restraint, and slipped about like a sea-serpent. I have since learned that withal he is very affectionate and kind, and popular with all he knows, but I was a stranger then.

RIGHT EYE. V = about $\frac{9}{200}$. Refraction (by the ophthalmoscope), M = $\frac{1}{10}$. With correcting lens, V = about $\frac{20}{100}$, rather less. Pupil seemingly natural size, and fairly movable. Iris sluggish but sensitive and infundibuliform. Subconjunctival veins tortuous and engorged. I could not detect arterial pulsations. Only slight turbidity of the humors. Tension markedly increased. (Glaucomatous cupping not apparent, but found at a subsequent visit to be very plain.)

LEFT EYE. V = O. Refraction (by the ophthalmoscope), M = $\frac{1}{8}$. Pupil fully enlarged and immovable, the iris crowding into the anterior chamber. Vitreous turbid; excavation of optic nerve visible. But the lid drooped so quickly under the necessary light that the view was very unsatisfactory. Expression of the eye very dull, and the cornea insensitive. Subconjunctival veins much engorged. Extreme degree of tension.

I was about to leave for the train on a short vacation, and as no operation could be had without home correspondence, a solution of pilocarpine was ordered instilled in the eyes. From various imperative causes without my control, though pilocarpine, and after sufficient trial, eserine also, was systematically used, an operation was not available until September 4th, when, the situation being substantially unchanged, I iridectomized each eye. The cornea of the left eye was very hard, and the iris much congested; the right structures were less affected. The reaction in the right eye was almost nothing; the left was injected, dull, and heavy for about fourteen days. As to vision, the immediate condition was not materially changed from that before the operation; but the corneæ were sensitive, and the irides less sluggish, the right iris acting quite perfectly. Other changes incident to the changed tension, self-suggestive, were also present, but need not be detailed.

Over three months have now elapsed since the operation was performed. Sight has returned to the left eye, and the vision of the right has steadily improved.

# GRAFTS FROM THE MUCOUS MEMBRANE OF THE MOUTH TO SUPPLY DEFECTS IN THE MUCOUS MEMBRANE OF THE EYE.

By W. F. SMITH, M.D., of Chicago, Ill.

AS the following case, occurring in private practice, has been an exceedingly interesting one, I take the liberty of presenting it in some detail.

May 18th of this year Mr. C. requested me to see his new-born son, in consultation with Dr. John Guerin. The little patient, three days' old, was suffering from ophthalmia neonatorum. Dr. Guerin related that the birth had been a protracted one, and at its completion the left eye was found to be swollen and already discharging pus. The right became affected the second day. The child was otherwise healthy and well formed.

The left upper eyelid seemed more than ordinarily infiltrated. The cul-de-sac was brought to view with difficulty, but the forced examination caused but very little flow of blood. The central half of the cornea was occupied by a grayish infiltration. The pupil was barely visible, but there was no hypopyon.

The right eye was almost as seriously implicated as its fellow, though the corneal ulceration was not so far advanced.

The treatment consisted in careful applications of nitrate of silver, in 10 % solution, with a camel's-hair brush, the excess of nitrate being washed away with a solution of chloride of sodium. For a few days the applications were made twice a day ; later only once a day. The nurse in attendance was instructed to wash the lids, at intervals of a few minutes, with a saturated solution of boric acid, and to keep pledgets of borated cotton, soaked in the solution, constantly applied over the lids.

The purulent discharge had entirely disappeared after three

weeks of such treatment. The corneal ulcers never penetrated the anterior chambers, but a broad leucoma covered each pupil. The leucomas gave no evidence of weakness, however, and there was no tendency to bulging.

The lower lids became quite normal in appearance, but a tendency to entropion of the upper lids was noticed, especially during contractions produced by bright light.

As the entropion became so decided that the lashes remained constantly in contact with the corneæ, it was thought advisable to extend the external canthus of each eye. This was done on the 24th of June, by dividing the fibres of the orbicularis underneath a triangular flap of skin, previously dissected directly outwards one quarter of an inch, its base parallel with the median line of the body. After division of the muscle, the point of cuticle was drawn down into the external cul-de-sac by a suture. The extended free margin of each lid was stitched over from mucous membrane to skin by a single thread. The permanent extension secured was about one eighth of an inch.

At first it was thought that this entirely corrected the entropion, but after a few weeks the lashes were again noticed to sweep the corneæ, producing some irritation, and preventing the corneal cicatrices from clearing.

*July 21st.*—The ends of a loop of tread were passed between the skin and the fibres of the orbicularis from the margin of the lid to the brow, and were fastened by a slip-knot over small rolls of borated cotton. The loop was tightened every morning, until drawn clear through the lid. The effect of the cicatrix thus produced seemed very good, and proved permanently so for the right eye. The inner free margin of the lids had suffered no atrophy—as is the result after trachoma,—and the curve of the lashes had always remained normal.

In a few weeks the edge of the left upper lid was again found turning inwards, the lashes impinging on the cornea. The conjunctiva of this lid seemed almost entirely absorbed, and cicatricial tissue occupied the space between the upper cul-de-sac and the free margin of the lid. It was plain that nothing further could be done without supplying the lost mucous membrane from some source. The requirements of the case seemed to exclude the use of rabbit's mucous membrane; accordingly, on September the 5th, assisted by Drs. Guerin and T. J. Sullivan, I successfully supplied the inner surface of the lid with mucous

membrane from the mouth. The details of the operation were as follows :

All the instruments used were previously immersed in 95 % carbolic acid and then washed in hot water that had been boiled. The hands of the operators were bathed in a 2 % solution of carbolic acid. Boric acid was dissolved in boiled water to saturation and used to wash the face and eyes of the patient. A similar solution was used for the sponges, which were of borated cotton. A bowl of sterilized water, containing about 2 % of salt was prepared and kept at a temperature of 98° F. In the latter floated a piece of smooth cork that had been made entirely aseptic.

Chloroform was administered to perfect anæsthesia. A strong thread was passed through the lid near the centre of its free margin, and by means of the loop thus formed the lid was everted over a rubber spatula and held firmly in position by an assistant. An incision was then made on the inner surface of the lid about one line from, and parallel to, its free margin. This incision was carried through the cicatricial tissue, through the cartilage and fibres of the orbicularis almost to the outer cuticle. By drawing upon the thread above mentioned, Dr. Sullivan stretched the wound and made it gape till the inner surface was of normal width.

While the assistants stilled the bleeding the right cheek was everted, exposing its mucous surface. After cleaning it thoroughly with the boric-acid solution, I dissected out a piece of the mucous membrane approximating in size that of the exposed, denuded, inner surface of the lid. I was careful to cut it thick enough to include the submucous areolar tissue. This piece of membrane was then spread out on the smooth surface of the prepared cork and kept saturated with drops of the warm salt water while manipulated, and easily trimmed to the desired shape with a sharp knife. Two needles, that had been threaded on one piece of No. 1 silk, were then passed through one end of the membrane and deeply into the cork. Two other needles were similarly caused to transfix the other end of the membrane ; when the needles were withdrawn from the cork and made to pass through the lid in such a manner as to fasten the buccal membrane over the denuded inner surface of the lid. The threads were tied over pledgets of borated cotton on the outer surface. The mucous membrane was now spread out so as to cover the denuded surface well ; the edge next the cul-de-sac was united to it by two

sutures, and two other sutures sufficed to unite the outer edge to the free margin of the lid. All instruments were withdrawn and the lid allowed to resume its normal position. The closed lids were covered with chemically pure boracic acid and a layer of borated cotton which was fastened in position by strips of antiseptic adhesive strip. The wound on the interior of the mouth was closed by sutures.

The little patient recovered from the chloroform nicely, and on the following morning seemed to suffer no pain or other inconvenience. On the second day the dressing was removed, also the threads that had been tied over cotton on the exterior of the lid. There was no swelling or extra secretion or other evidences of inflammation. The eye was thoroughly washed with a warm solution of boric acid, but no attempt was made to evert the lid.

On the fifth day after the operation a solution of cocaine was instilled between the lids, the upper lid was everted, and the remaining stitches removed. They were found firmly united to the transplanted, as well as to the other tissues, so that their removal occasioned the loss of a little blood. Every particle of the transplanted membrane was firmly attached in its new position, and was perfectly healthy in appearance. The entropion had disappeared, the edge of the lid rested in its proper position, and the lashes curved upwards and outwards, well away from the cornea.

I visited the patient as lately as the 12th of October, and found no further tendency to entropion. The corneal cicatrices are rapidly clearing ; the pupils, readily seen through the still imperfectly transparent corneas, are free in the irreaction to light of varying intensity, and our little patient has excellent prospects of good vision.

In the treatment of the inflammatory stage of this case, the great object was to prevent necrosis and rupture of the cornea. To accomplish this a vigorous use of the ten-per-cent. solution of nitrate of silver was deemed necessary. During a rather extended experience with this dreaded disease, I have repeatedly attempted to use other methods and milder remedies, but have had cause to regret it just as constantly. As to the destruction of the mucous membrane that resulted here, I can only say that I watched the cornea with the greatest solicitude, and did not hesitate to use the silver solution in accordance with the indications

there in evidence. I am convinced that a milder use of the nitrate would have entailed a loss of the corneal membranes. The violent character of the inflammation—the fact that it had begun before parturition was complete—and the deep infiltration of the left upper lid, may have had the greater effect in the destruction of its conjunctiva.

The order and the successive steps of the operation here described were not suggested by the requirements of this single case, but were the result of some experience in the transplantation of mucous membrane. The former cases seem to be worthy of mention here.

The first was that of a man who had been admitted to Cook County Hospital and assigned to my ward. He was about thirty-five years old, name Finlay, a day laborer, never having suffered from any constitutional disease. Some months before a mass of lime had fallen into his left eye. The result was a complete symblepharon of the lower lid, the free margin of which was attached to the cornea and reached up so far as to hide two thirds of the pupil. The bulb was almost entirely immovable. The operations were made in the amphitheatre of the hospital, in the presence of the hospital surgeons and class.

I separated the lid from the bulb and attempted to transplant the mucous membrane of a rabbit. After covering all the denuded surface of the eye and its lid with the rabbit's membrane, I dusted iodoform over it, also over the closed lids, covered the eye with absorbent cotton, and fastened it in position with adhesive strip. Next morning the house surgeon in charge reported that during the night the patient's temperature had risen to 103° F.; that he had been partially delirious, and had refused all food. On removing the dressing it was found that all that part of the cuticle that had been covered with iodoform was very pale, as if it had been scalded, and that the transplanted mucous membrane was lifeless. All the stitches were removed, the wound thoroughly cleaned with boric-acid solution, and the parts left to heal in their former position.

This is the first and only well-marked case of iodoform poisoning in my experience.

Six weeks afterwards I made another attempt to relieve the patient, but on an entirely different plan. My previous failure with the rabbit's membrane made me loth to try it a second time. After again separating the lid from the bulb, I succeeded in covering a strip of the denuded surface of the globe immediately below the cornea, about one eighth of an inch wide, with conjunctival flaps taken from above the cornea. This was the best that could be done with the available conjunctiva, and it exhausted all ordinary resources in such cases. Not wishing, however, to leave the lower lid to acquire a new deformity, I thought of the possibility of transplanting from the buccal mucous membrane. This idea was acted upon at once, and I transplanted a piece large enough to cover all the remaining denuded surface. Much to my delight the entire piece healed in its new position. Mobility of the eye became perfect, and the cornea cleared up so as to insure tolerably good vision. This occurred in the spring of 1887. I have lately had satisfactory reports of this patient from other patients he has recommended, but I have not seen him personally.

Shortly after having treated the case just described, Dr. Plaum, of this city, brought to me one of his patients, a man about forty years of age, who had lost an eye in youth. He was a laboring man of small means. He had worn a broken, artificial eye, and had otherwise neglected it till the mucous membrane had been almost entirely destroyed. The lids could be separated hardly more than one fourth of an inch. After cutting away the cicatricial membrane so as to be able to separate the lids, I transplanted a piece of buccal membrane, five eighths of an inch wide by a little over an inch in length. No part of it was lost. It all became firmly attached, and though a little cumbersome at first, it was possible, by some careful stretching and patient manipulation, to introduce a small artificial eye. After wearing this a short time he found that he could wear a larger one, and now wears a medium-sized eye with comfort.

These two cases suggested the methods employed in the one here first mentioned.

From all three it would appear that the mucous membrane of the mouth is peculiarly adapted to the purposes of transplantation. I have not seen a complete report of Reverdin's cases. In the September number of these ARCHIVES, however, page 300, Dr. I. Grossman states that "in Stellwag's clinic thirty-three cases of mucous grafting had been reported, twenty-six being done with rabbit's conjunctiva, and the rest (seven cases) with mucous membrane from various parts of the body." He does not specify what parts of the body, but contributes one case of operation for symblepharon in which "the loss was supplied with an oval piece of vaginal mucous membrane."

Numerous circumstances are conceivable which would make such a membrane objectionable, even were it always available; but a large supply of mouth must always be ready to hand.

Since the above has been in print Dr. Knapp has kindly directed my attention to a paper by Dr. Edwin van Millingen of Constantinople in the *Ophthalmic Review* for November, 1887, p. 309, in which the author reports an operation for entropion by which he transplants a strip of mucous membrane from the inner surface of the lip, into a slit made in the free margin of the lid below the in-curving lashes.

The operation described by the present writer in the June number of these ARCHIVES for 1887, p. 177, provides for the transplantation of a strip of skin taken from above the ciliary margin of the lid without pedicle.

Dr. Millingen objects to the skin grafting in such cases because he thinks the fine hairs, usually present on the cuticular surface, would become almost as annoying as the formally in-curved lashes. This objection would appear to be well-founded; but in a number of my cases, which have been under observation for as much as two years, I have observed nothing to be complained of in this regard. Without having tried Dr. Millingen's operation, I cannot help but think the mucous graft would fail to furnish as firm a support to to the overlying lashes as one of skin; and that the latter more nearly simulates the normal tissues at the free margin of the lid.

# ON THE EXTRACTION OF CATARACT.

By Dr. J. RHEINDORF, of Neuss.

Translated by J. A. Spalding, M.D., Portland, Me.

MY reasons for publishing the statistics of so few as 273 extractions are to recall the attention of the profession to posterior capsulotomy in scleral extraction, with its successes and failures, to recommend a few alterations in the method of operating, and, finally, to offer a slight contribution to the question of antisepsis in ophthalmic surgery.

The five years during which these cataracts were extracted may be divided into three periods, distinguished less by alterations in technique than by alterations in the care of the patients and in the prophylaxis. To the first period, from 1880 to 1884, belong 203 operations, in which the clinical surroundings and the results were most unfavorable. The patients were mingled together, and although the greatest care was taken to keep from the operating-room all cases that might be infectious, it was really impossible to seclude the patients carefully, at least just before the operation. The prophylaxis consisted simply in cleansing the eye with a weak carbolic solution, in dipping the instruments into boiling water just before using, in bandaging with linen compresses wet in a 5-per-cent. carbolic-acid solution, and over that salicylated wadding and a binocular flannel roller. The same routine was observed at the regular change of dressing once every day in normal cases.

The results in 203 cases, including 24 complicated cataracts, were in 179 uncomplicated cases:

A good result[1]: 80 % = 143 (S > $\frac{1}{8}$).
A satisfactory result: 4.4 % = 8 (S = $\frac{1}{8}$ — $\frac{1}{14}$).
Unsatisfactory result: 5 % = 9 (S = $\frac{1}{15}$ — $\frac{1}{100}$).
Loss: 10.6 % = 19 (S < $\frac{1}{100}$).
In 24 complicated cataracts:
A good result in 20, a satisfactory result in 1, and a loss in 3.

The second period extended to June, 1885, at which time the clinique had been so arranged as to have a special room in which all operations for opening the eye (with the exception of purulent keratitis) were performed. The ventilation was excellent, no other patient was allowed to enter, and all patients for operating were isolated immediately upon their reception. Otherwise the operations were carried on as of old. The 27 uncomplicated extractions then performed gave a good result in 25 cases and a loss in 2.

During the third period, sublimate (1 to 1000) was used for cleansing the eye and its neighborhood before, during, and after the operation, as well as for disinfecting the instrument. The conjunctiva was freely washed out with this solution, the instruments were also placed into it, and then but slightly wiped with linen that had been moistened with the same. After the operation the eye was once more sprinkled with sublimate. If any chronic conjunctivitis or disease of the lachrymal sac was present, the section was made downward so that it could be irrigated eighteen hours later without entirely opening the eye. From the second day the eye was opened once or twice in the twenty-four hours and atropine instilled. Whenever the bandage was changed the lids were carefully cleansed with sublimate and a fresh linen compress moistened with the same applied, then salicylated padding, etc.

Forty-four cataracts were thus operated, but one has been excluded because the patient became delirious on the third day, tore off the bandages, the incision opened, and hopeless irido-cyclitis supervened.

[1] I have never seen S greater than 20–30 after any extraction, either in my own practice or in that of any ophthalmic surgeon, and I have seen that amount but once, and perhaps a dozen cases of 20–40 in a practice of twenty-six years.

In the remaining 43 cases, of which 3 were complicated, there was a good result in 38, a satisfactory one in 4, and 1 total loss.

The 22 losses in the first group include 3 from retinal detachment, 5 from suppurative iritis, 9 from suppurative irido-cyclitis, and 5 from plastic irido-cyclitis.

In the second period, with 2 losses in 27 extractions, we find 1 of suppurative iritis, and 1 of plastic iritis.

In the third period, containing 43 extractions, we find 1 eye lost from plastic iritis.

Thirty-eight secondary operations were necessary to determine the final amount of vision.

The chief contrast between the first and third period lies in the number of suppurative cases, of which, in the first 203 extractions, there were 14, but in the last 43 none.

Part of this result may be due to increased clinical advantages and skill, yet the sublimate cannot be too highly estimated. Thus, the three complicated cases in the last period were so inherently inclined to infection that I should hardly have dared to operate without the greatest confidence in the sublimate. For in one the eyelids were covered with thick crusts, while symblepharon and pannus were well marked; dacryo-cystitis was present in the second, and trachoma in the third. The authorities advise us to cure these complications before the operation, but who can tell how much must be got rid of in order to avoid infection, or where is the patient who will submit to such a half-way cure? Although preparatory treatment is an excellent thing, there is no longer any such necessity for it since sublimate has been introduced, or, more correctly speaking, the sublimate compensates for any defect in the preparatory treatment. I have never seen suppuration since using it in iridectomies and magnet operations. Moreover, I think that if we use it freely, faulty operations do not trouble us so much as formerly, as, for instance, in the last series of extractions, when too narrow an incision had to be enlarged with the scissors, or when the vitreous prolapsed before the lens had been extracted, or even before the excision of the iris, or when the iris had to be

patiently fished for, or, finally, when spoon-extraction became necessary.

The following case of primary corneal suppuration without involvement of the iris proves that sublimate cannot prevent all infection, or, at least, that every suppuration does not depend on infection.

A patient of 84, with a waxy-white skin, submitted to cataract extraction; the conjunctiva tore in several places, but otherwise the operation was smooth. On the next day the eye was free from irritation, but on the second day the cornea became opaque. Atropine, iodoform and sublimate were of no avail. The iris remained unaffected, and without pain or perceptible swelling of the lids the cornea necrosed.

I have never known sublimate in the above strength to injure the cornea. Unfortunately it dulls the knife. If this remedy shall prove the sovereign one against infection and consequently against suppuration, the doubts expressed concerning posterior capsulotomy must be abandoned. It cannot be denied, however, that vitreous lying directly in the incision offers a fruitful territory for the propagation of infection, as well as an obstacle to cicatrization, nor that it thus favors infiltration of the edges of the incision whenever a suitable conjunctival flap has not been obtained.

Although I am inclined to attribute my losses from suppuration to inflection during the operation, yet most of the cases of plastic iritis were, I think, due to other noxious influences. In two cases large pieces of cortex were left in the anterior chamber, in two others the lens was with difficulty extracted, whilst in the remaining three the incision fell somewhat too close to the ciliary region.

I care less than formerly about leaving fragments of cortex in the eye. My previous opinion, that the commingling of the cortex with vitreous lessened the danger whenever fragments of cortex were left behind in the anterior chamber, has been confirmed when the cortex was soft. Still, I am unable yet to decide whether it is the commingling of cortex and vitreous, or the establishment of a free communication between the anterior and posterior segments of the

globe, that prevents the outbreak of irido-cyclitis and increased tension despite the swelling of the cortex. It is nevertheless a fact, that whenever at a glaucoma operation I extracted the partially clear lens with posterior capsulotomy, yet left considerable masses of cortex behind, I never met with inflammation or increased tension. On the contrary, in one case in which a colleague half-accepted my method, and removed most of the lens without opening into the vitreous, the tension was permanently increased, and the eye was totally destroyed.

The case is different in cataracts with sticky coherent cortex, those brownish-yellow or brown cataracts in which both the cortex and the nucleus are of nearly the same consistency. Here the capsule and iris probably unite with each other in a few hours after the operation, by those bits of cortex that have not mingled with the vitreous, so that on one hand the iris is irritated, and on the other a bridge is formed over which the vessels of the iris run to the capsule and excite irido-capsulitis. The plethora of both of my patients with this form of cataract may have favored the plastic inflammation, but I am not prepared to say that this or any constitutional dyscrasia exerts any influence in this respect.

I doubt if difficult delivery of the lens is alone a cause of irido-cyclitis. I should rather refer it to purulent infiltration of the lips of the incision, which we used occasionally to see before sublimate was introduced. But in opposition to Schweigger (these ARCHIVES, vol. xvi., p. 284) I refer primary plastic irido-cyclitis to incarceration of the iris and bits of capsule in the incision, which often happens in difficult delivery of the lens, and in spoon-extraction when the incision is too short. The reasons that led me to this belief are that in all of my cases the iritis began from the third to the fifth day, and not directly after the irritation of the operation, but with the cicatrization of the incision, and obstinately resisted all treatment. Therefore I conclude that the transitory irritation caused by the delivery of the lens does not cause the tedious irido-cyclitis, but that this is due to the dragging of the incarcerated portions.

The third cause of irido-cyclitis is an abnormal position of the incision. I have long since abandoned the perfectly linear section so as not to fall into the ciliary region, which we cannot entirely avoid if the incision is to be large enough The flap, as I now make it, is 1 *mm* high, puncture and counter-puncture in the sclera, whilst the rest of the section lies in the corneo-scleral margin, or even in the cornea. The incision in some restless patients fell into the dense tissue at the scleral margin, so that the recovery was protracted, and in three cases plastic irido-cyclitis localized chiefly at the incision excited sympathetic irritation.

In regard to capsular incarceration as a cause of iritis, I would say that this may have occurred much oftener than I once thought, when I now recall the irregular manner in which I used to divide the posterior capsule. It really seems as if when I pushed the hook into the capsule, pulled it through the pupil, and then turned it slightly at the incision in order not to catch it, the capsule must often have fallen into the incision. I now try to loosen the hook from the capsule while still in the eye by pushing it backward, and in case this does not succeed I pull the capsule out and cut it off behind the hook.

The treatment of all subsequent inflammatory processes is antiphlogistic. I never use ice after a normal operation, unless irritation appears within the first day. Moist heat has never seemed of any use except in marasmic patients with the eye free from injection, and the cornea growing opaque; in such cases the flow of blood and the nourishment of the eye may thus be favorably influenced. If the infiltration is yellow though circumscribed, perhaps at the incision, warmth hastens the suppurative destruction by increasing the conjunctival hyperæmia. It also seems contra-indicated if plastic iritis appears during the early weeks after the operation. If then any warm wet applications are made it is simply because I have no idea of restoring the vision, but wish to terminate the inflammation and the pain as quickly as possible. Such at least is my experience, however much it may conflict with that of other operators.

All inflammatory symptoms, especially chemosis, discoloration of the iris, and swelling of the lens, are treated with strong solutions of atropine, cauterization of the external surface of the lids with solid silver nitrate, followed with ice, free scarification of the conjunctiva, and leeches to the nostrils. If the incision or the iris appear to be suppurating, the eye is frequently sprayed and washed out with the sublimate, and powdered iodoform is applied. In this way I have occasionally obviated panophthalmitis, and obtained at least an eye with good looks, even if sightless.

It is best to wait six months before attempting any secondary operations. The delay is indeed long and disagreeable for both patient and surgeon, yet I rarely operate earlier unless the eye is very quiet. Too early interference with broad adhesions between the iris and capsule, or in total occlusion of the pupil, is generally followed by hemorrhages and closure of the newly formed pupil. If the secondary obstruction is simply capsular, then I split it, or extract a bit of the tissue, or I make a preliminary iridectomy and then split the capsule.[1]

The only reason I ever had for performing posterior capsulotomy was to avoid secondary cataract. Although I have not been successful, the results on the whole have been satisfactory. I refuse to operate secondarily in total occlusion of the pupil, or with thick neoplasms behind the iris, or with a bulging iris and decreased tension, even when perception of light is satisfactory. There is but little chance of obtaining useful sight in such cases, and, according to my experience, the danger of exciting sympathetic ophthalmitis is too great to risk the operation for a theoretical improvement of the sight. As things now stand, there is greater reason for performing extraction on the second eye than an iritomy on the first, for a successful iritomy is rare. Nevertheless let me be understood as referring only to neoplastic irido-cyclitis, for which this operation was really suggested, for we all

[1] The difference between Schweigger and myself in our experience of secondary cataract after posterior capsulotomy (he had 32 %, I had but 10 %) can only be explained by assuming that he simply punctures the hyaloid, whilst I extensively divide it.

know that a simple secondary cataract can as well be relieved by an iritomy as by any other means.

Three cases of fatal sympathetic ophthalmitis were observed, and referred to the bad situation of the incision. The sympathetic affection appeared in all the cases about five or six weeks after the extraction; the locality of the operation was very sensitive to the touch; tension decreased, and plastic iritis with deposits on Descemet's membrane was seen in both eyes. Twice the perception of light was satisfactory when the second eye began to be affected. Most of these sad cases are due to what turn out to be unjustifiable consideration for the operated eye; we fear to abandon all hope of restoring sight so long as perception of light remains; we try to obtain a trifle of vision and lose all. It is difficult to predict with any certainty that sympathetic ophthalmia will burst forth, and often after enucleation has been advised by a sagacious surgeon, a less considerate one may save an eye with some form at least, whilst nothing is ever heard of the predicted sympathy. Nevertheless, when the incision has fallen too near the ciliary region, and irido-cyclitis, with bulging of the iris at its periphery, and pain near the locality of the incision still remain five to seven weeks after the operation, I should always advise enucleation. In two cases of extraction on both eyes at one session, suppurative irido-cyclitis ensued in one eye, and the recovery of the other seemed retarded by sleepless nights and mental excitement. Remedies were of no avail, yet all went well after the irritating eye was enucleated. In a fourth case with sympathetic iritis serosa, I enucleated the operated eye and succeeded in saving the other.

It seems as if four cases of sympathetic ophthalmia were very unfavorable to my method, if we judge from the statistics of others where no such accidents are recorded; but at the worst these cases cannot be referred specially to posterior capsulotomy, for it is well known that the scleral extraction excites the sympathy from occasional faulty location of the incision.

Mention must also be made of three cases of iritis serosa

following the operation, because in one of them the disease extended to the second eye. The patient was a myope, aged forty-two, of 1-7, with posterior staphyloma. The cataract in the right eye must have developed very rapidly, because a skilful ophthalmic surgeon who saw the patient three months before, made no mention of cataract. Three months after the extraction iritis serosa appeared in the operated eye and in about four weeks in the other. In the other two cases the iritis confined itself to the operated eye. The first traces of the disease were observed two months after the extraction; that is to say, long after the incision had healed. In one case only was the result less favorable, but there are good chances for a secondary operation.

I grant that retinal detachment must appertain to my method, for I never saw it after any other, If we refer to Gouvea's experiments (*Graefe's Archiv*, xv.), we shall be surprised that retinal detachment is so rare in my method, for the loss of vitreous is often large. I think, however that Iwanoff's fears are theoretical, and Gouvea's experiments on animals absolutely worthless in judging the result of loss of vitreous in man. Coarse experimental operations and the restlessness of the animal must have more to do with the detachment than the loss of vitreous. None of my cases were myopic, and all lost but little vitreous. On the contrary, I have seen large loss of vitreous in high degrees of myopia without detachment. So I think my method must favor this accident. It was seen in two cases three months after extraction; the first patient suffering from arthritis, the second from enlarged spleen. It is also possible that the tearing of a very tough hyaloid may have caused the detachment. But I have never paid any attention to this point in any cases.

I do not use cocaine (though I tried it in a few cases), for it makes the eyes very soft, and although there is less danger of loss of vitreous, the extraction is rendered more difficult, owing to the loss of *vis a tergo*, so that the spoon has to be employed. Though I do not dread this step, since the introduction of sublimate, it occasions ruptures of

the hyaloid at a spot which does not satisfy the optical relations of the eye, whilst at the same time it is difficult or even impossible to make a subsequent artistic opening in the pupillary field.

The results of scleral extraction, combined with posterior capsulotomy, are so satisfactory that I see no reason to change. The points demanding the strictest attention are the situation of the incision, careful excision of the iris, and the greatest care to avoid incarceration of the capsule in the incision. Losses will always follow extraction, *no matter whether at once or later after the operation.* They are to be expected after interference with so sensitive an organ as the eye. The further we keep from the ciliary region the less our losses will be. In order to minimize the injuries following extraction, we need a detailed statement, not of the successes, but of the failures, and that without any consideration toward the operator. The summary of perfect success, half success, and failure, under the latter of which we include $S = \frac{1}{\infty}$ and $S = 0$, is worthless; it may serve to emphasize the skill of a few operators, or is at least intended to, but practically speaking it would prove more valuable by the addition of details.

## CHOLESTERINE IN THE EYE.

By C. W. TANGEMAN, M.D.,

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CASE 1.—James Mc S., a healthy, white laboring man, æt. 48, when making application at my office complained that he was gradually losing his sight in the right eye, while vision of the left eye had been lost by accident some years ago. A careful cross-examination brought out the following history: About three years since the patient received a perforation wound of the eye. The tang of a fork had penetrated the cornea, lacerated the the iris, and wounded the lens. Sight was almost immediately obliterated, although the patient enjoyed good vision previously. The eye became intensely red and caused much pain and suffering. These symptoms passed away in the course of a few months, leaving the globe somewhat smaller and softer than normal. The pupil was smaller than normal, and irregular; while the iris was a little tremulous. The cornea still showed the point of perforation by a small opacity. The aqueous in the anterior chamber had the appearance of being turbid, with a distinct line of deposit, seen in the lower angle of the anterior chamber. By means of the oblique illumination the turbidity was seen to be caused by a mass of silvery-white flocculi, or crystals, in large quantities. When the eye was at rest this mass gravitated to the bottom, and formed the deposit above spoken of, while on the slightest movement a spray of shining crystals floated round and round in the anterior chamber, passing in and out through the pupil. With the ophthalmoscope the beauty of the picture was very much enhanced. The red reflex from the fundus of the eye made an impression on the observer, that is best expressed in the words of Dr. W. W. Seely, nearly a quarter of a century ago,[1]

[1] *Cincinnati Lancet and Observer*, 1866

when describing a case of cholesterine in the vitreous humor. Viz.: "It seemed as though one was looking at a miniature sensible horizon, with all the stars shooting chaotically from their places." The spectacle is a grand one, and was repeated as often as the patient moved the eyeball. A few moments, rest, and the vitreous was again sufficiently clear to see the fundus distinctly. By the reflected light the crystals in the vitreous had a yellowish or golden appearance, while in the anterior chamber with the refracted light they were silvery white. The vitreous, which was liquefied, was completely filled with the same mass. The lens had become absorbed, permitting a ready interchange of fluid between the anterior chamber and the vitreous body, which was shown by the manner in which the cholesterine crystals passed from one chamber to another when the eye was rapidly moved. This patient was kept under observation for some time, but the foreign mass, which while not examined microscopically was undoubtedly cholesterine, did not perceptibly diminish or increase. It did not seem to aggravate the symptoms present, or disturb the vision, which was only quantitative. If this mass is being constantly absorbed, it certainly was just as rapidly reproduced, since it appeared to remain the same for over a year, when the patient was finally lost track of.

Case 2.—David S. presented himself at Prof. Seely's clinic, because his eye became periodically inflamed. The patient, a bar-tender, had received a blow on the eye with the fist about two years prior to the application for treatment. From present symptoms, the injury had produced a dislocation of the lens. Intense inflammation of the eye set in, which passed away in the course of about three months without any treatment. The pupil appeared irregular, with a few posterior synechiæ; vision nil. The eye had the appearance of secondary glaucoma. It was subject to occasional attacks of inflammation, which left the eyeball painful for some weeks. The anterior and posterior chambers were filled with a mass of cholesterine crystals, which moved about in the aqueous humor very rapidly upon the slightest movement of the eyeball. A few moments quiet of the eyeball caused a gravitation of the mass to the bottom of the anterior chamber, which gave it much the appearance of hypopyon.

Cases have been recorded where the quantity of cholesterine present in the aqueous humor caused a dimness of

vision when it was agitated a while, but when the eye was kept perfectly quiet for some time the patient could read with the greatest ease.

The first case reported is of interest, since instances are rare where the cholesterine was found present alike in the aqueous chambers and vitreous body. True, these two cases, like the majority reported, had both at some time received an injury to the eye, which has always been looked upon by all writers as the prominent feature in the case, or possibly the causative agent. In a dissertation on "the formation of cholesterine in the human eye" by Schaumberg, we find that the subject formerly was looked upon as a disease called cholestearitis (Desmarres).

That these cases were of frequent occurrence during the time when discision of the lens was practised is readily understood, since the dislocated lens not infrequently set up an inflammation which acted similar to the presence of a foreign body in the eye. The cases described by Desmarres,[1] Stout,[2] and Sichel are all such cases where the operator attempted to remove the cataractous lens from the pupillary area by dislocating it into the vitreous chamber. The presence of cholesterine crystals in the eyes operated on as above stated was not due to the liberation of the cholesterine, always found in the lens as some writers think, but carried there and deposited by some process set up by the foreign body. The statement made by Mc Namara in his late work,[3] that "these cases are quite frequent," must be understood. He has made his observations in India, where the operation for the removal of the opaque lens above mentioned, is so frequently resorted to. One thing seems certain, that we cannot look upon any of these cases as idiopathic, nor as a disease, since the presence of cholesterine in the eye may only mean that certain pathological changes have taken place in some of the tissues. It may be observed in the anterior chamber without an affection of the lens, or in the retina without a

[1] "*Traité théor. et prat. des mal. des yeux*," 1847, p. 665.
[2] *Annal. d'oculistique*, 1846, p. 74; *ibid.* p. 167.
[3] McNamara, "Diseases of the Eye."

liquefaction of the vitreous. Yet it has been observed in the vitreous when no disease of this structure could be diagnosed. Its presence in the vitreous does not cause its liquefaction, nor is it likely to be a result of the liquefaction, but the same cause acting on the vitreous body or other structures of the eye may determine a deposition of this excrementitious principle, which is constantly found in the blood. Theories as to the source of cholesterine crystals are few and very unsatisfactory. It is known that the lens and vitreous humor contain some of this principle physiologically, but not in the crystaline form, nor in quantities such as is often seen in the eye, even though it could all be extracted by some process. Lehmann suggests that it is a product of decomposition, but since we know that it is constantly found in the blood, this theory need receive but little consideration. Some authors attribute this condition to an inflammation of the choroid, iris, or retina, but it has been observed a number of times when the eye was in a perfectly healthy condition. Seely,[1] in an article on cholesterine in the vitreous suggests that its presence in the crystalline form is due to a certain morbid state in which its association with the other normal elements is broken, which causes its precipitation in the form of crystal. For a long time it was held that only diseased eyes contained cholesterine. Wolf[2] associates liquefaction of the vitreous with the presence of cholesterine while the vitreous is not by any means diseased in all of these cases. Physiologists claim that the brain, and possibly to a limited extent the general nervous system, is the source of cholesterine, the blood coming from the brain, containing a larger proportion than the blood flowing toward this organ. In the liver it is again separated from the blood, when it passes into the intestine with the biliary secretion. Just how it is formed in health, where a certain quantity is daily excreted, is not known unless we can accept the theory of Rocafull,[3] namely, that it is due to a chemical decomposition of the albu-

[1] *Lancet and Observer*, 1866.
[2] "Diseases and Injuries of the Eye," p. 250.
[3] *Monatsbl. f. Augenheilkunde.*

minoids. R. reports a case of cholesterine of the lens and attributes its presence to the origin as just mentioned. Experiments show that patients afflicted with cirrhosis of the liver have a larger amount proportionately of this principle in the blood, but only because this disease hinders its proper elimination.

The author is now investigating this class of cases with the ophthalmoscope, with a view to determine whether in these patients where the blood is overcharged with cholesterine it is more likely to be found in the eye. In the four cases reported by Webster Fox,[1] that he calls idiopathic, vision was not materially disturbed, nor was there a lesion of any of the structures of the eye discovered.

Heretofore the presence of cholesterine in the eye and some pathological condition of this organ were always associated. The report of this observation only confirms in the author's mind the belief that cholesterine *may be carried* by the lymph circulation and deposited in the various tissues. It happens occasionally that even rare affections are accidentally associated with well-recognized diseases, which, when considered from an etiological view, is very apt to lead the observer astray. Courtade,[2] reports a case of synchysis scintillans, where these appearances were observed in both eyes two months after the patient had had a shanker, and attributes the presence of cholesterine to syphilis. Possibly the cholesterine disappeared under the administration of iodide of potassium and mercurial ointment. There can be no doubt but that such an association of symptoms was purely accidental. The presence of these crystals in the retina,[3] ciliary body, or anterior chamber,[4] without liquefaction of the vitreous or disease of the retina or lens, would appear to indicate at least that they were not formed there, but carried there by some circulating medium. In the cases termed idiopathic the cause could not be determined by the observer. After analyzing the literature of this subject, we are almost

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[1] KNAPP'S ARCHIVES, vol. xii., p. 179.
[2] *Union méd.*, xxxix., p. 17.
[3] A. v. Graefe, *Graefe's Archives*, vol. ii., p. 219.
[4] De Wecker, *Graefe und Saemisch.*

forced to the above explanation. A destructive inflammation of any or all the various structures of the eye could not in and of itself produce cholesterine. It may get into the anterior chamber, as is shown by the patient observed by Van Moll,[1] where the anterior chamber was well filled with cholesterine, which rapidly re-appeared after paracentesis of the cornea had been made. The eye in this case eventually became amaurotic, which necessitated enucleation. A microscopic examination of the lens and its capsule showed that these structures had always been free of any diseased process. The source of the cholesterine was due to a detached retina caused by injury, which found its way into the anterior chamber—how? Why these cases are not more frequently met with when the causes to which the affection has been attributed are daily observed, is difficult to explain.

Little or nothing need be said about the *treatment* in these cases; where the eye is not diseased the foreign mass disappears without any damage to the eye, while its presence in a diseased eye does not change the prognosis. General constitutional treatment has been recommended.[2] Hyvernat reports a case where a large mass of cholesterine was found in the healthy vitreous body, while the choroid was diseased. This case may suggest a solution why so often cholesterine is found in eyes where the vitreous is liquid, as a consequence of disease elsewhere. It has been found in the anterior chamber, where it could not have reached this space only by the lymph circulation. It has been found constituting small tumors of the middle ear,[3] without any manifest disease of this organ. Graefe[4] records a case of purulent inflammation of the lachrymal sac where the discharge contained enormous quantities of cholesterine. Tröltsch[5] speaks of its occurrence in a purulent discharge from the middle ear. It has been found in

[1] *Weekblad. van het Nederl. Tijdschr. voor Geweesk*, ii., 595.
[2] *Lyon médical*, xxxiii.
[3] Kuhn, *Arch. f. Ohrenhkunde.*, vol. xxvi.; Schwartz, *Chirurg. Krank des Ohres*, S. 221.
[4] *Arch. f. Ophthal.*, vol. iii., 2, 357.
[5] *Lehrbuch der Ohrenhkunde.*, S. 425.

abnormal quantities in almost every structure of the body. Its presence could not be explained in any manner than that the lymph or blood circulation, or both, was the channel through which the cholesterine crystal found its way into the various structures. From the observations of Seely, Fox, and others, the term scintillating synchysis is objectionable, inasmuch as we may find cholesterine in the vitreous, or even other parts of the eye, without a liquefaction of the vitreous humor.

# A CASE OF NASAL COLOBOMA OF THE CHOROID.

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AND

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OPHTH. SURGEON TO THE EPISCOPAL AND THE CHILDREN'S HOSPITALS.

(*With a colored plate, Tab. iv. of vol. xix., Germ. edition.*)

THE following case is believed to present a unique form of congenital anomaly, and as such to be worthy of being placed upon record.

During May, 1885, Thomas H., unmarried, aged twenty-two, applied for treatment on account of a severe attack of serous iritis in the left eye. *History.*—Father and mother living and healthy; four living sisters, two of whom are in delicate health on account of pulmonary disorders; one brother died at birth, and one sister in early infancy from unknown causes. None of the family have ever had inflamed eyes; the patient had the ordinary exanthemata of childhood, but has never had any severe illness during his lifetime. For a year previous to his present trouble he suffered with neuralgia, chiefly in the distribution of the left supraorbital nerve. He has also had brachial and intercostal neuralgia, a short laryngeal cough, and is asthmatic. He denies all venereal disease, and has never previously had an inflamed eye. Three years ago he was struck by a shuttle on the left side of the bridge of the nose, but this accident was not attended with any serious local damage to the nose or the eye. For two weeks before the onset of the iritis he suffered with constant orbital and periorbital neuralgia. The vision appeared equal in each eye. The condition at the first visit was as follows:

R E, V=$\frac{20}{xx}$; Jr.1. 6″– 18″.

L E, V=$\frac{20}{c}$.

*R E.*—Large, round disc, shallow excavation; retina striated; low H.

*L E.*—Fine pericorneal injection; cornea hazy, and numerous punctate opacities on Descemet's membrane; iris discolored; no distinct view of the eye-ground; nerve greenish and deeply cupped; veins large and tortuous; the upper central artery lost as it approaches the nerve; lower vessels still more indistinct; at the lower and inner side of the disc a large indistinct whitish area; above, a reddish patch, probably a retinal hemorrhage.

The patient was put upon iodide of potassium and bichloride of mercury, and directed to use atropine drops locally. He came daily for treatment for one week, and then disappeared for four months. At the expiration of this time, during which he had more or less continuously used his remedies, he came again. The eye was now white and quiet, a few floating vitreous opacities were detected, and a clear view of the fundus, presently to be described, obtained. Both eyes were atropinzed, and the refraction error corrected. This proved to be O D, + 0.65 $^{S}\frac{15}{xv}$; O. S, + 0 90 $^{S}\frac{15}{xx}$. These glasses were ordered, and compound tincture of cinchonia and bichloride of mercury given internally. He was not seen again for nearly two years, when he returned on account of chalazia on the upper and lower lids of the left eye. These were dissected out, and the cuts healed satisfactorily. One year later, December 1887, having broken his glasses, he came again; and then the following study was carefully made:

The ophthalmoscope shows in the right eye the optic disc large, round, and outlined by a black and generally sharp-cut pigment line. There is a large shallow dish-like cupping of its surface and a yellowish-red conus downward, perhaps underlying its lower segment. The retina is striated, especially along the larger vessels; and conspicuous glistening striæ are visible between the disc and the macula. The general condition of the eye-ground is good, and the macula normal. There is low H.—Vision is $\frac{20}{xxv}$? raised to $\frac{20}{xx}$? by + 0.65 sph.; and accommodation is D = .25 p.p. 14 cm.

In the left eye the disc is also large, as on the right; but the cupping of its surface is more marked, especially to the lower nasal side, where it shows a decided greenish coloration increasing

toward the margin. A yellowish conus at the outer side, bounded by a sharp-cut black band extends upward into a rounded patch of choroidal atrophy and pigment heaping just below the upper temporal vein ; and similar disturbance of the choroid embraces the upper margin of the disc. To the nasal side of the nerve and a little below its level is a rounded whitish area tangent to the disc, vaguely marked above and out, and separated from the disc by a band of peculiarly brown pigmented choroid. A large vein, lower nasal, crosses this area nearly in its horizontal diameter, receiving two extremely tortuous vessels in the middle, and bending sharply at its overhanging nasal margin. This area is greenish-white, and opalescent in its central portion, and depressed below the general level of the eye-ground, its deepest portion near the lower nasal edge requiring — 3. D to bring it into clear view. Only the lower and nasal margins are abrupt ; and there a band of yellowish, partly pigmented choroid surrounds it, outlined beyond by a strong black band. The other margins are shelving, especially the upper-outer, where the brown mottling in which the choroid loses itself is extremely peculiar. A falciform outgrowth, greenish and semi-transparent, arises from the emergence of the vessels upon the disc and extends its sharp edge some 3. D forward into the vitreous. It reaches upward and downward, somewhat concentric with the margin of the coloboma, and loses itself at its extremities in fine threads stretching forward into the vitreous, the lower termination being less visible and less prominent than the upper. A small semi-detached vesicle, 3–4 D in front of the eye-ground, floats over the nasal margin of the disc. The remainder of the eye-ground is normal, except for the marked striation of the retina at the posterior pole, as in the other eye. The refraction is low H. ; V = $\frac{20}{xxv}$ ?? raised to $\frac{20}{xx}$ ? by + 0.90 sph.; and the accommodation is the same as on the right. There seems an enlarged blind-spot ; but with quantitative perception of light in the region of the coloboma.

It is altogether probable that we have here acquired, as well as congenital lesions ; and it may be assumed that the choroidal disturbance above the disc is of the former character. The falciform membrane, which extends out from the disc as a thin, stretched, and non-vascular membrane, is probably congenital ; and was doubtless present, hiding the vessels, at the first examination. The rounded coloboma,

which presents almost all of the usual features of such anomalies, cannot but be congenital; for it was certainly present within a few days after his inflammatory trouble began, and has undergone no notable change since. Nothing but its unusual position would seem to call at all in question its character as a choroidal coloboma of the ordinary type—an arrest in development and non-closure of the fœtal cleft. It is not unusual to find a small coloboma of the choroid below the disc, inclining slightly to the nasal side, as in the case reported by Mittelstädt, where the iris showed a "pseudocoloboma" horizontally inward; but no case has been found on record where the choroidal cleft lay, as here, wholly to the nasal side. The problem of its genesis we leave others to solve.

### *Description of Plate IV.*

NASAL COLOBOMA OF THE CHOROID.—Erect image of left eye, showing the rounded greenish-white area to the lower nasal side of the disc and the crescentic falciform membrane projecting into the vitreous. The nasal margin of the coloboma is seen to be overhanging, and hides the vein which turns over its edge; the opposite side is shelving and shows the thin pigmented tissue, which represents the lacking choroid. Pigment disturbance (pathological ?) is seen above the disc and the marked glistening striations along the vessels and at the posterior pole. The general level of the eye-ground was seen with + 1., the deepest part of the coloboma only with — 3. D.

# TWO CASES OF EPIBULBAR CARCINOMA, FROM THE SURGICAL CLINIC IN BONN.

By Dr. C. HEYDER, of Munich.

(*With three illustrations.*)

Translated by Dr. J. H. Shorter.

In the present paper are reported two cases of pure epibulbar carcinoma, which, early in 1884 and in January, 1886, respectively, came under observation at the surgical clinic in Bonn, the reporting of which was kindly entrusted to me by Prof. Frendelenburg.

As cases of epibulbar carcinoma have been only rarely observed (as will be seen later the entire literature embraces only some thirty cases), the two here reported are deserving of special interest, from the fact that in none of the other cases described did the tumor attain to such a size as in these two.

As, furthermore, both of these cases were operated on, and the macroscopical as well as histological conditions thoroughly examined, an opportunity was afforded of going carefully into the subject, making a comparison with those hitherto reported not without interest.

The first case has been already used in my inaugural dissertation.[1]

Case 1.—Anna Maria V., unmarried, fifty-two years lod, from Heidgen, near Witlirschlick, was admitted to the surgical

[1] On Enucleation of the Globe on Account of Epibulbar or Palpebral Carcinoma.—Bonn, 1885.

clinic, on July 14, 1884, for the extirpation of a large tumor, which sprung from the globe of the right eye.

The patient made the following statement as to previous affections :

Sight had begun to weaken in both eyes at the age of ten. Twenty-five years ago the patient was ill with variola, which raged in her native village at that time. She still retains marks of the disease quite distinctly. Whether the eyes were affected by the variola could not be ascertained from the history. In 1863 she was treated at the ophthalmic clinic for granular conjunctivitis of both eyes. When she came under observation in 1884, it was found that the function of the remaining eye, the left, was considerably reduced through pannus and keratoconus.

In the spring of 1879, so she stated, the right half of the face, especially in region of the eye, was attacked with erysipelas. In May, 1883, the patient first noticed a small elevation on the right eyeball. The exact spot occupied, whether the sclero-corneal margin or only the corneal region, could not be ascertained. The patient, however, claimed that for a long while before there had been a white spot at the point first attacked, which was caused by one of the eye diseases. Whether this spot had been a scar, the result of one of the eye affections, we cannot at present decide. This tumor soon increased to the size of a pin-head ; by September it was about as large as a walnut, and from that time it grew more and more rapidly. At the same time the tumor became the seat of severe, spontaneous pain, which greatly increased on touch. The patient also states that the tumor now commenced to bleed at the slightest provocation, and a considerable quantity of purulent fluid was discharged from its surface. When the woman was admitted to the clinic, the region of the right eye was found to be occupied by a nodular tumor the size of a hen's egg, which on all sides overhung the orbital margin. Of a general globular shape, it presented a many-fissured surface, on which here and there could be recognized traces of recent hemorrhages. The tumor protruded from the orbit like a large mushroom. The eyelids could not be recognized either from in front or from the side ; in order to bring them into view it was necessary to draw forward the upper and lower borders of the tumor. Then it was seen that unfolded they rested upon the convex surface of the tumor. No part of the globe could be made visible, as it was completely covered by the mass ; but its existence could

be presumed from the fact that all movements of the other eye were accompanied by similar coincident excursions of this mass, until restricted by contact with the edges of the orbit.

FIG. 1.

The visual power was ultimately destroyed, the patient being no longer able to distinguish between light and dark. The frontal nerve seemed to be also indirectly implicated, as the patient described the feeling of formication in the parts of the skin supplied by that nerve.

Swelling of the glands was not demonstrable anywhere, and the general condition was likewise fairly good. The tumor was extirpated, along with the globe, on January 22, 1884, incision being made directly on the orbital margin. The entire contents of the orbit were removed, and no attempt was made to cover the defect by a plastic operation. The bleeding cavity was tamponed with

iodoform gauze, over which was applied a bandage. Later some indifferent applications were brought into use. By this treatment the course of healing was undisturbed; neither fever nor any local inflammatory reaction was observed. As early as the 11th of February, the patient was allowed to go home, with the wound well granulating, into which on all sides the skin was being drawn. On her departure the granulating surface was only 2 *cm* long by ½ *cm* wide.

On May 29th the patient presented herself at the clinic again. The healing had made very good progress. There remained a granulating spot twice the size of a hemp seed, corresponding to the centre of the original wound. No relapse.

On December 5th the patient was again in the clinic; the healing had been perfect for a long while. The orbital cavity seemed diminished, and the eyebrow was somewhat pulled down, so that it was partly below the supraorbital margin. There was still no trace of any recurrence or of any enlargement of the lymph glands to be observed.

## REPORT ON THE MACROSCOPICAL CONDITION OF THE TUMOR.

The extirpated growth, viewed externally, appears like an irregular nodular projection of about the size of hen's egg, separated by shallow depressions into several portions. The surface is rough; everywhere papillæ, some small, fine, others thicker, are discernible. Along the whole under surface, hidden from view, lay the lower lid completely everted. The upper eyelid is less well preserved, the conjunctiva especially being drawn over into the surface of the tumor, so that the free margin of the lid rests directly on the latter.

The globe, in sagittal section, seemed to be quite well preserved both as to shape and size. The tumor covered it as if it had been poured over the eye, in front covering the cornea completely and extending backward upon the sclera beyond the equator (see fig. 2). The measurements are as follows: The greatest thickness downwards is 16 *mm*, and forwards 12 *mm*; above, the thickness varied between 11 and 17 *mm*. See fig. 2, which represents a diagrammatic section of the tumor, in order to show its relative shape and size.)

The globe must therefore evidently have been drawn forward with considerable elongation of the muscle and optic nerve, as the posterior border of the neoplasm rested above and below against the orbital margin. The globe must likewise have been turned downwards, as the tumor extended above farther back than it did below. To a point beyond the equator, the tumor not only lay close on the sclera, but seemed also united so fast to the latter that it was only by violence possible to separate one from the other. The structure of the sclera, however, was unchanged so far as this could be determined macroscopically.

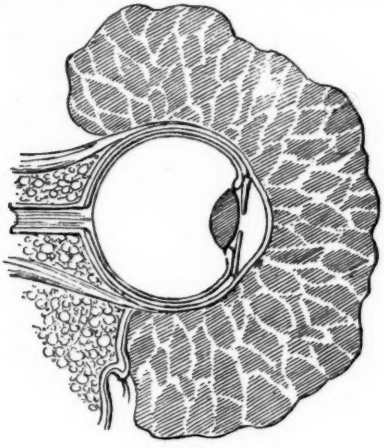

FIG. 2.

The cornea was nowhere perforated, though in the upper half it seemed strikingly thin ; in the lower it was of normal thickness. In the centre the tissue of the tumor passed directly into that of the cornea, so that here the dividing line between normal and pathological tissue could no longer be recognized ; the posterior surface of the cornea, however, was perfectly smooth. The tumor itself showed a radiate arrangement, and in the deep parts adjacent to the globe was more compact, but externally of a delicate, cauliflower-like structure. Iris, retina, and choroid, as well as the optic nerve and the muscles, presented nothing peculiar.

MICROSCOPICAL CONDITION.

Section perpendicularly through the entire thickness of the tumor and through the corneo-scleral junction.

The sclera is essentially unaltered, well supplied with blood-vessels, partly of a capillary character, partly showing clearly the structure of the arteries and veins. Lying upon it is found a tolerably thick connective-tissue layer, isolated spots in which appear strongly infiltrated with round cells. Then follows the tumor, the papillary structure of which, recognizable even macroscopically, now becomes very apparent. The epithelial masses, arranged like palisades, open outward, pushing outwards, while in some parts of the elongated papillæ a remnant of connective tissue containing blood-vessels can still be recognized. The more external the more the epithelial masses predominate, and are more closely found together, so that only here and there a cleft can be seen between the papillæ.

The cornea is relaxed, that is, abnormally wide spaces are found between the individual layers; this disruption is especially distinct at the sclero-corneal margin. Interposed between the tumor and cornea there is a connective-tissue layer of a scar-like character and of like thickness as the cornea itself. It is a continuation from the loosened connective-tissue layer, which has been described as lying without the sclera. It extends, gradually diminishing in thickness, over a fourth of the cornea. Beyond it the epithelial masses are directly on the slightly loosened cornea, the structure of which is but little altered, while spurs penetrate here and there into its tissue.

In the external layers of the tumor the epithelial new formations present in general a papillary arrangement; the individual strands, however, are stouter, in part club-shaped, leaving larger interstices in the perforation.

Some quite large blood-vessels course through the connective-tissue processes, which lie in the interspaces, and which also in part push into the base of the papillæ. These processes show likewise very strongly marked round-cell infiltration. In general, however, the gross structure of the tumor mass retains a radiate arrangement.

The picture of transverse and oblique sections through the tumor is an extraordinary irregular one. Large masses of epithelial cells, traversed by bands of connective tissue, are chiefly to be seen; especially in the latter numerous blood-vessels are visible, in part arterial with thin walls, in part quite broad capillary loops.

The epithelia themselves are relatively small, but distinctly recognizable by the large nucleus with glistening nucleolus; they vary in shape, although chiefly oblong, their edges being directed inwards and outwards.

The anatomical diagnosis, therefore, would be—epibulbar carcinoma. It was impossible, from the size of the tumor, to determine, from the anatomical examination, the point of origin.

Case 2. This was that of a peasant, Johann H., fifty-five years of age, from Ketting, near Neuwied.

The vision in the left eye was said to have been almost entirely lost ten years previously, through a disease which was not very painful, concerning the nature of which nothing could be learned. The patient stated that "a film" came over the eye, which constantly increased in density. Later, about two years ago, a bulging of the cornea developed, occasionally burst, and, after evacuation of the fluids, became smaller. Furthermore, in the meantime, a small tumor appeared at the place where the cornea perforated spontaneously. At that time the patient had already been advised by a physician to have an operation performed, but as he still regarded the affection as not important, the operation was not undertaken.

In the last two months the tumor has grown very rapidly, and occasioned the patient severe pain, which caused him, on January 4, 1886, to seek aid at the surgical clinic.

The appearance which the region of the left eye presented at the time of his reception was about as follows:

The eyelids (especially the under one) are pushed forwards and stretched; they enclose an immense palpebral fissure, which remained constantly open, the patient not being able to completely close it. The skin of the eyelid is livid in color, somewhat œdematous, and traversed by large, engorged veins. The surface shows some unevenness, which, as shown by palpation, is occasioned by the corresponding irregularities of the parts lying below.

The lids are movable over the subjacent tumor, except that along the palpebral fissure the lower lid is for its entire length bound fast to the tumor, whereas the border of the upper is only in connection with the tumor for a small space at the inner canthus. The consistency of the tumor is somewhat dense.

In the palpebral fissure nothing can be recognized of the globe, being filled with the tumor masses, which constantly secrete a small quantity of puriform fluid.

The part of the visible surface belonging to the lower portion of the tumor is smooth throughout, only here and there interrupted in continuity by a large cleft. The upper parts situated in the palpebral space are, however, much fissured, especially towards the inner canthus, so that they present a delicate, cauliflower-like appearance.

The pain extended beyond the limits of the tumor into the region of the supra-orbital nerve; pressure on the spot where the nerve issues from the supra-orbital notch was extraordinarily painful.

The operation was performed on January 9th. As the skin of the upper lid was unaffected it was preserved, in order, later on, to cover part of the defect; only at the inner canthus, where it had become involved in the growth, a small part had to be removed. The conjunctiva of the upper lid was divided by a cut in the neighborhood of the fornix, and detached from the parts below.

Then a cut was made around the lower part of the tumor, from the inner to the outer angle of the orbit, preserving only a narrow strip of skin of the lid. Next the entire contents of the orbital cavity were evacuated, the tumor and with it the globe being shelled out, and finally the optic nerve was divided from the outer side with the scissors.

At the operation the tumor was found to be nowhere adherent to the adjacent bony parts, neither did it fill the entire posterior part of the orbit. Chisel and hammer were therefore not required to remove the bony wall.

The hemorrhage was not very considerable; ligation of two arteries checked it.

After the completion of the operation, the portion of the skin which was retained was utilized as a partial covering for the defect which had been occasioned. A few stitches were inserted at each angle, for uniting the upper with the lower lid, so that the

raw surface still remaining was not very large. Even this could have been corrected by transplantation of a flap from the skin of the adjacent parts, but having the experience of the first case in view, this was abstained from. Finally the wound was aseptically cleansed and dressed, and a bandage applied covering all.

The course of the healing was entirely without fever. At the first change of bandage, six days after the operation there was moderate suppuration. A few days later the bandage was changed again. The surface of the wound was covered with good granulations; very little suppuration. On the 22d of January, at his urgent request, the patient was discharged. Three months later he informed us that the healing process had gone on undisturbed and that the wound was entirely closed. No sign of any relapse as yet. With the exception of the neuralgia previously mentioned, which occasionally returned, the condition of the patient is excellent.

### REPORT OF THE MACROSCOPICAL EXAMINATION.

The extirpated tumor was of about the size of a hen's egg. Looked at from in front the greater part of the growth was seen to be covered with the skin of the lower lid, which is clearly recognizable by the eyelashes. Above is seen that part of the tumor already described as lying in the palpebral fissure; and uppermost of all, the exposed part of the growth, divided by coarse and fine fissures into small nodules and papillæ. A small portion of the growth in this region is covered by the small piece of skin which was removed during the operation.

Description of a sagittal section as shown in Fig. 3.

The globe seems atrophied and very much changed in shape, having become of an oval form through pressure of the masses of neoplasm above and below. Evidently these changes were due to the resistance offered to the growth forward of the tumor by the skin which stretched over it. The tumor lay closely attached to the globe as far back as the equator; above, however, an obtuse border projected back and beyond this zone. The large portion of the tumor appeared as a consistent homogeneous mass, only here and there divided by intervening spaces into lobes.

One large fissure was especially striking, leading from the palpebral opening downwards and backwards into the tumor and dividing it into two not exactly equal parts.

The measurements of the tumor are as follows: The total width of the growth amounts to 53 *mm;* the width on the sagittal section, at a point lying opposite the optic nerve, is 9 *mm;* of the portion covered by the lower eyelid, 30 *mm.* The greatest projection of the growth upwards, measured from the upper wall of the globe, amounts to 12 *mm,* and that downwards, reckoned from the lower wall, to 39 *mm.*

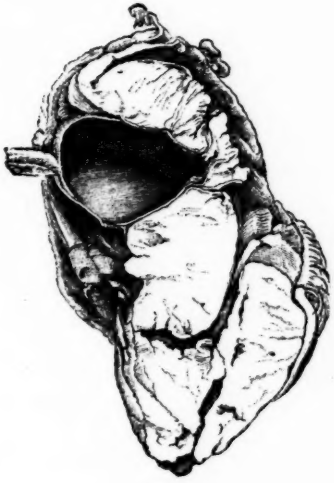

FIG. 3.

The sclera does not seem to have undergone any changes in its structure, but the cornea is ruptured and gapes; there is no anterior chamber. The masses of neoplasm which have insinuated themselves between the gaping halves of the cornea, and embrace them from within and without, have not, however, produced atrophy of the corneal tissue. The outlines of the cornea can be clearly traced deep into the tumor (see fig. 3).

The arrangement of the tumor can be distinctly recog-

nized, even macroscopically, as a radiate one, the centre lying at the point of rupture of the cornea.

The iris lies unchanged in the cavity of the globe, nor can any changes be perceived macroscopically in the other coats of the eyeball.

MICROSCOPIC EXAMINATION OF THE EXTIRPATED TUMOR.

Section made in a sagittal direction through the growth and the globe at the spot where the continuity of the cornea is interrupted.

On the outer side of the cornea, which stretches into the tumor mass, lie broad bands of long epithelial cells, which are placed close together broadside on to one another, with no tissue whatever between them. Some of these bands extend a short distance parallel to the cornea, and then bending out radiate into the growth. The others, especially those belonging to the anterior portions of the cornea, go directly in a straight line from the cornea. In their further course, after ramification, they disappear in the growth, and thus effectuate the radiate arrangement of the remaining tumor masses.

In the section through the globe, both halves of the cornea, which diminish gradually in thickness the deeper they penetrate into the growth, so that they cannot be followed to their termination, present a peculiar appearance under the microscope. In the posterior portion, towards the globe, the cornea has preserved its normal thickness, having yielded to the pressure of the tumor and been pushed into the cavity of the anterior chamber, there being no counter-pressure at this point against the inner surface of the cornea. In the central portion, on the contrary, the cornea has become thinner, but its structure has become more compact. This behavior is very easily explained by the fact that, whilst the growing tumor exerted pressure on the surface of the cornea externally, the latter was prevented from bulging or otherwise yielding to such pressure, by reason of the presence of masses of the tumor between the two halves of the cornea, which kept them apart.

The more anterior the further the cornea departs from its

normal shape. Here the cells, having proliferated most luxuriantly towards the torn ends, split the cornea into lamellæ, between which they insinuate themselves. Whilst further back this cleavage is single, it becomes more and more numerous towards the ends, the individual lamellæ becoming constantly thinner, until finally they disappear in the tumor, ramifying in every direction in layers of various breadth.

The portions of the tumor which are found between the halves of the cornea are shown under the microscope to have had their origin in the anterior parts of the cornea. The rows of cells here turned inwards are in close contact with those coming from the other side, and thereby have pushed apart the gaping cornea.

The tumor itself proved to consist chiefly of epithelial cells. In the neighborhood of the cornea, the said cells are closely crowded together; in the external parts of the growth they become larger and irregularly shaped, and show distinctly, in addition to the large nucleus, a glistening nucleolus. Larger masses of cells are traversed by connective-tissue bands, and enclosed in them. There can be also recognized in the connective tissue, cross and longitudinal sections through blood-vessels. There are no changes in the remaining portions of the globe.

Remembering that there was a division of the cornea, and that, furthermore, changes were first noticed at the point where this division had occurred, it naturally suggests itself to the mind that just here the development and spread of the growth had its origin. Observation of the tumor on the sagittal section, which was made right through the affected part of the cornea, confirms this opinion, as a radiate arrangement of the grosser parts of the tumor, proceeding from the lacerated cornea as a centre, is distinctly recognizable, even with the naked eye.

This behavior becomes still more apparent from the microscopical examination, as above mentioned.

In this latter case we have one of very great rarity to deal with, so far as concerns the origin of the growth. In the majority of cases mentioned in the literature of the

subject, no etiological factor could be pointed out, whereas in this one the carcinoma undoubtedly originated from a scar.

Besides this, almost all known cases are distinguishable by the seat of the tumor, which is specified as in the highest degree characteristic of corneal tumors.

It is, for example, generally specified by authors that the tumor was located at the sclero-corneal margin, when speaking of a small growth; when describing a larger one, that it extended over the sclera and cornea, but showed a firm attachment only with the sclero-corneal border, whilst everywhere else it could be easily lifted up. Our case has, in common with the other, the fact that the changes in the corneal substance itself were inconsiderable; there was also no tendency towards proliferation into the interior of the globe, notwithstanding that there already existed an opening in the cornea.

From these experiences it seems that epibulbar carcinomata have very little tendency towards invasion of the neighboring parts, a fact which naturally carries great weight in the question of an operation. Furthermore, a relapse does not easily occur after an evacuation of the orbit on account of such growths, as is shown by our first case. The second cannot be very well cited as proof of the fact, as the time which has elapsed since the operation is too brief.

In looking over the literature one is struck with the fact that the authors, almost without exception, are silent as to the question whether, after evacuation of the orbit, a plastic covering should be made or not. Genzmer is in favor of a secondary transplantation of a skin graft upon the granulating defect. Whilst Prof. Trendelenburg formerly (following the precedent of v. Langenbeck) always formed a compensation flap out of the surrounding skin, he has, in recent times, performed the operation without attempting any plastic covering. The excellent result obtained in both the above-mentioned cases, as also after extirpation of the globe for other indications, is demonstration of the correctness of this procedure. Also where both eyelids must be

removed and the entrance into the orbit remains exposed, the surrounding skin is drawn so strongly towards the orbit that, when the cavity is filled with granulations, a complete covering of skin exists over the funnel-shaped opening. There remains a shallow trough, covered at the borders with skin, in the centre with a scar, which is relatively only slight disfigurement, and the patient is spared the large scar on the forehead which remains after the plastic operation.

As supplement to this paper, I may be allowed to present a short sketch of the most important facts which have thus far become known regarding epibulbar carcinoma. Such a collection is not without interest, as some of the authors have made reports as to the macroscopical and histological conditions observed, as well as in regard to the therapeutics employed and their results.

In the ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY, 1878, vol. vi., p. 291, there is an article by E. S. Holmes, of Chicago, on thirteen cases of ocular tumors, one tumor of the optic nerve, and one case of panophthalmitis with a coagulum, which was mistaken for a tumor.

The writer first presents a short survey of the different forms of tumors of the eye which he had an opportunity of collecting in his own practice, comprising 20,000 eye patients. Among the great mass of material he found only two cases of epithelial cancer of the sclera and cornea. One of these cases the author briefly reports as follows :

M. H. C. H., forty years of age, noticed, two and a half years before the removal of the eye, and first at the margin of the cornea, a small, painless elevation, which grew rapidly. In the course of a year and a half it was twice removed and frequently cauterized with nitrate of silver. But as relapses constantly followed, enucleation was performed. The tumor was of a round shape, $\frac{1}{3}''$ in diameter, $1\frac{1}{2}'''$ high, with sharp borders and yellowish and ragged surface.

The vision had remained almost entirely unaltered, as the growth hardly reached the pupillary margin.

The microscopical examination showed that the tumor was firmly united to the cornea and sclero-corneal margin ; a part of

it, however, simply lay over the sclera. The growth consisted simply of epithelial cells lying piled upon one another. The greater portion of the cornea was destroyed by the epithelial proliferation or already permeated with epithelial cells.

Steffan, in *Zehender's Klinische Monatsblätter*, 1864, vol. ii., p. 81, publishes the following case of medullary carcinoma of the cornea:

H. F., fifty-two years of age, presented himself in 1862. In the lower outer quadrant of the left eye the cornea was covered by a partially brown pigmented growth. The consistency of the tumor was soft, its surface uneven; the height was 1‴. It was furthermore not movable in the cornea, and ended in sharp borders about 1‴ from the pupil. The conjunctiva showed here and there brownish pigment plaques.

For six months the tumor remained the size of a pin-head, without causing any annoyance. Six months later the patient presented himself for operation, the tumor in the meantime having increased in height to 3-4‴.

On removal of the growth it was seen to be in intimate connection with the sclera and cornea only at the border; otherwise it was easily lifted up.

The microscope showed a mass of cells almost without stroma. The cells were round and contained one or two shining nuclei.

In the same periodical for the year 1869 Keyser describes an operation for removal of a cancerous growth from the surface of the eyeball:

The patient, a young man of nineteen, had noticed for two years a red spot on the corneo-scleral margin. The significance of this spot was mistaken by his physician, and treated as a pterygium with astringent washes and caustics, which treatment, however, seemed to stimulate the growth.

There is now present a reddish tumor, which reaches about to the pupillary border and extends over the sclera. It is 7 *mm* in length and 6 *mm* in width. It is firmly united to the cornea and sclera. The pain caused by it is bearable. A small cancerous tumor had been previously removed from the nose. The vision of the diseased eye was intact; the other eye was blind from an injury. The growth was carefully extirpated, and healing followed by first intention. Two years later there had been no relapse.

As to the results of the histological examination the author gives no details, but contents himself with the statement that the tumor showed a cancerous structure.

In vol. vii., p. 51, *l.c.*, Colsman reports a case of epithelioma of the cornea :

A man, sixty-seven years of age, had in the right eye a round tumor of about $2\frac{1}{2}'''$ diameter and white color. Through a hand lens many small elevated points of a papillary nature were seen.

The tumor began a line below the border of the cornea and projected up not quite to the lower margin of the pupil. It had abrupt borders and an elevation of $\frac{3}{8}'''$.

One year later the patient showed himself again. During this time the tumor had grown and now reached to the middle of the pupil. The man refused an operation.

Finally from vol. xviii., p. 178, we take a case of cancer of the sclera-corneal margin, described by Knies :

Mrs. R. F. had at the inner corneal margin of the right eye a reddish-yellow uneven growth, which had existed for a long time and was painless ; its shape was that of an isosceles triangle, the base of which, corresponding to the corneal margin, measured 3 *mm* and the altitude 4 *mm.*

The growth was extirpated and examined microscopically. There was found an enormous proliferation of epithelial cells, with manifold excrescences into the conjunctival tissue. Even beyond the borders of the tumor the conjunctival tissue was infiltrated with round cells in the shape of so-called epithelial nests.

The tumor cells were more than double the size of those of the normal epithelium of the cornea and conjunctiva. The line of demarcation separating them from the normal epithelium was very distinct. In the sections which had been stained with hæmatoxyline the nuclei of the tumor cells were much more deeply tinged than those of the normal epithelium.

The seat of the tumor was in the cornea and in fact outside of Bowman's membrane. Whilst in isolated places the portions of tumor resting on Bowman's membrane had displaced the normal epithelium, there were, on the other hand, places where the corneal epithelium had been lifted up and served as a covering of the growth.

In *Nagel's Jahresberichte* are found several cases—1870,

p. 290 *ff.* Lebrun: Tumeur épithéliale du globe oculaire (*Annal. d'Oculist.*, vol. lxiv., p. 132):

Within the space of 7 or 8 weeks a tumor had made its appearance in a man, sixty-three years of age, which grew to half the size of a hazelnut. The greater part was seated on the sclera, about $\frac{2}{3}$ of it on the cornea, in two lobes, one of which was deeply pigmented. The vision remained perfect. The treatment consisted in its extirpation, from which according to all appearances a radical cure resulted. The microscopical examination showed an exceedingly vascular connective tissue, containing a quantity of epithelial cells. Pigment was likewise found.

Thos. Reid: On Epithelioma of the Eye (*Glasgow Med. Journal*, vol. ii., 2, p. 147).

As this case was only mentioned cursorily and I have not said journal at command, there is nothing special to report about it.

A. Closson: A Case of Cancroid of the Cornea and Sclera (*Arch. f. Path. Anat.*, vol. l., p. 56).

After citing a series of cases the author reports one observed by himself, but remarks at the outset, in opposition to Berthold (*Arch. f. Opth.*, vol. xiv., 3, p. 149), who agrees with the opinion of Thiersch and Waldeyer, that he, for his part, could not accept these views, but, on the contrary, had arrived at different results as derived from his own observations. The patient, a herdsman, fifty-three years old, had noticed, so he stated, for some years a nodule, which, in the latter months, had increased in size, become painful, and had been in various ways removed by physicians and cauterized. The tumor then rapidly increased in size, while at the same time in the left side of the head severe pain had developed.

Situated at the upper left corneal margin was a pale reddish growth with rough surfaces, of the size of a hazel-nut when the eyeball was removed. It extended 6 *mm* over the sclera, terminating in an abrupt border; towards the cornea it became gradually flatter and extended outwards over the centre of the pupil; height, 4 *mm*.

The following lengthy explanation of the result of the

histological examination is intended to show that in the neighborhood of the blood-vessels the first, and, in fact, the larger, masses of tumor cells appeared. Closson then summarizes in the four following sentences the results arrived at:

1. The development of a carcinoma is preceded by a profuse development of blood-vessels in the neighboring tissues.

2. The development of the cancer cells is traceable to the blood-vessels.

3. The future of the cells depends essentially upon the conditions to which their surroundings expose them, and not, or at least not essentially, upon their origin.

4. The destructive effects of the carcinoma are based on the fact that the cells, through proliferation or distention, split the tissues apart, just as a skull may be burst open with soaked peas.

In conclusion the author seeks to bring further proof in favor of his assertions, in connection with which he offers many interesting remarks, to enter upon which, however, would overstep the limits of this paper.

Langhaus publishes a paper in *Virchow's Archives*, vol. xlix., p. 117, in which he endeavors to demonstrate that all pigment in melanotic tumors arises from metamorphosis of red blood corpuscles. He noticed distinctly that the pigment granules were always found enclosed in cells; that the numerous large pigment granules had the shape perfectly of the red corpuscles of human blood; they were disc-shaped, appearing round when looked at from in front, and rod-like from the side; in fact, even the central depression, or biscuit shape, could be recognized in many of the corpsucles which stood on edge.

The case of melanoma of the cornea reported in connection with the above-mentioned studies, was a fourth relapse, locally, in a man forty years old. It sat like a mushroom on the cornea, with a narrow base at the sclero-corneal margin, but did not extend beyond the corneal border, nor did it involve the ocular conjunctiva. The surface of the tumor was smooth, and of light-gray color. The lowest

layers were deeply pigmented. The tumor had also invaded the tissue of the cornea, but more in the superficial than deep parts. As far as the growth had made progress the corneal corpuscles were more or less destroyed. As the author does not go further into details as to the results of the microscopical examination, we cannot be certain whether this case was one of a carcinoma or of a sarcoma.

Still other and numerous cases are reported in *Nagel's Jahr.-Ber.*, for instance, 1874, p. 314, by J. J. Chisholm, Ophthalmic and Aural Surgery Reports (*Richmond and Louisville Med. Journal*, Jan., 1873). This case was one of melanotic carcinoma, in the shape of three small, dark, round tumors at the limbus of the cornea, the largest of which was of the size of a millet-seed. As a relapse appeared an enucleation was performed. Nothing is mentioned as to the histological examination.

*Id.*, p. 317. P. D. Keyser: Clinical Contributions to Ophthalmology (*Med. and Surg. Reporter*):

The patient, fifty-nine years old, had four years previously noticed the beginning of the larger tumor. Now there are two cancroids at the scleral border of the cornea. The larger tumor is 5 *mm* in width; the other is somewhat smaller; the color of both is reddish. Occasionally the patient suffers extreme pain; the vision is perfectly normal; an excision was performed. Six months later no relapse could be noticed.

*Id.*, 1875, p. 241. W. Goldzieher: On a Case of Cancroid of the Cornea (*Pesther med.-chirurg. Presse*, No. 42, p. 658):

The present tumor developed in the patient (fifty-eight years old) within five years from a small wart. The growth juts out from the palpebral fissure like a mushroom, completely filling it and covering the entire cornea.

It is of a hard consistency, the surface uneven, and bleeds easily. After the enucleation Bowman's membrane was found to be completely intact. The result of the histological examination showed a tubular framework containing cells of an epithelial character.

*Id.*, 1876, p. 278. Schiess describes a tumor of the conjunctiva and cornea (Basel, 12, *Jahresbericht*, p. 29). Pro-

ceeding from the cornea, connective-tissue septa of palisade-shape extended into the growth. Between these septa, which have a radiate arrangement, large epitheloid cells have grouped themselves. Schiess regarded the growth as partly carcinoma, partly sarcoma.

Manfredi: Contribuzione alla genesi dell' epitelioma della cornea (*Rivista clinica*, 1870, p. 35):

The disease affected the right eye of a man, fifty-three years old. According to the statement, a little nodule appeared on the outer side of the cornea, following a slight blow from the bough of a tree, which remained stationary for twelve years. Then, as within a few months it reached the size of a pea, it was removed.

Three months later there was already a relapse of half the size of a raspberry, whereupon an enucleation was performed.

The histological examination showed a mass of cells with nuclei and nucleoli, cylindrical epithelium, pavement epithelium, and prickle cells. The tumor was situated on the limbus conjunctivæ; its height was 5 *mm*, and breadth 8 *mm*. A section through the cornea, conjunctiva, and sclera showed cylindrical projections and vascular loops.

The growth consisted entirely of cells. The growth of the tumor had its origin from the corneal epithelium, whilst the conjunctiva was unchanged.

Van Münster reported a case in his inaugural dissertation: Contribution to the Knowledge of Precorneal and Conjunctival Melanotic Neoplasms:

When Mrs. F., forty years of age, was convalescing from typhoid fever she noticed at the outer margin of the cornea of the left eye a pale flesh-colored spot, which became gradually a somewhat elevated growth. It was smooth, shining, extending somewhat over the cornea, and occasioned no pain. From August, 1871, a rapid increase of growth took place, set up, so it was stated, by the irritation of a foreign body. From that time dated the commencement of a brown pigmentation. A slight lancinating pain also was felt.

In January, 1872, the patient came under treatment. There was an oval tumor, the lesser portion of which covered the sclera, while the greater projected over the cornea to the centre of the pupil. The centre was blackish-brown, the periphery pinkish,

and the surface smooth. The vision was normal, but, on the other hand, the movement of the lid was somewhat restricted. The growth was extirpated. Five months later no relapse was apparent.

The diameters of the tumor are $1\frac{1}{2}$ and $\frac{3}{4}$ *cm*; the thickness, 2 *mm*. The epithelium of the cornea and conjunctive pass over it. In the tumor there are partly large round cells, partly polygonal cells, large nuclei and nucleoli; the protoplasm is darkly granular; many cells contain a quantity of pigment. The cells resemble epithelium. Narrow bands of fibrillated connective tissue are also visible.

In *Virchow's Archives*, 1870, vol. li., 515, Hirschberg describes a case of pre-corneal melano-carcinoma polyposum.

In the left eye of a peasant, fifty years old, a polypoid neoplasm made its appearance, having a dark color, projecting from between the lids, and bleeding easily. It was situated on the cornea, and had a broad base. At the corneo-scleral junction it sent roots into the tissue lying below it, but otherwise penetrated nowhere. The globe was intact. The tumor had at the base a length of 12 and a width of 10 *mm*. In front of the palpebral fissure it was 18 *mm* broad and 8 *mm* high. On the ocular conjunctiva there were two other black spots and a black point at the fold. The growth was extirpated; irregular polyhedral cells were especially numerous (round ones of flat shape). Besides other cell forms there was much pigment.

In the *Lancet* of July 13, 1872, is the following case of Julian Chisholm: Cancer of the Cornea Necessitating the Removal of an Eye in Which there was still Good Vision.

Mrs. B., forty-nine years of age, presented herself, in December, 1871, on account of a painful growth on the outer corneal margin of the left eye. It consisted of three parts, the middle and largest of which presented the size and appearance of a split pea; the others were of the size of a millet-seed.

A very similar growth had been extirpated and cauterized one year previously; six months after a relapse appeared, for which the same operation was performed. The operation is now performed for the third time. A good recovery followed, but already a few weeks later, a relapse appeared. After such unfavorable results of conservative procedure, an enucleation was performed. "A

microscopic examination exhibited all the indications of malignancy, with cancer elements throughout the corneal parenchyma, upon which the tumor had established itself."

Henry D. Noyes, M.D., New York: A Case of Melanotic Epithelial Cancer on the Surface of the Eye; Extirpation of the Growth with Preservation of the Globe as well as of the Vision (ARCH. OF OPHTHALMOLOGY, vol. viii., p. 145, 1878). The observation was made in October, 1878.

Mr. W. S. O., forty-eight years old, first noticed on the outer side of the left eye a black spot, which hardly increased in size for twelve years. But within recent years, and especially in the last couple of months, a rapid increase took place.

The tumor was 10 *mm* long, 5½ *mm* wide, and 4 *mm* thick. It extended beyond the outer edge of the pupil; the sclero-corneal portion was a deep black, the corneal a dark brown. The surface of the tumor was ragged, moist, and of a doughy consistence. It lay close on the cornea. The vision remained normal, only somewhat distorted by the copious conjunctival secretion. The interior of the eye was also normal. The growth was extirpated, and the microscopic examination showed epithelial cells which were arranged concentrically.[1]

The author made the interesting statement that among 70,809 patients, who, in course of ten years, had been treated at the New York Eye and Ear Infirmary, only three cases of corneal tumor of a malignant nature had been observed, the best proof of the rarity of this disease.

At the conclusion of his article Noyes reported another case, which was observed in the Brooklyn Eye and Ear Hospital.

B. L., fifty-two years old, noticed a small red spot on the sclera

[1] Dr. Noyes has been kind enough to send the following note on the further history of the case:

"The case of Mr. Ogden, with epibulbar tumor, was under my notice until February, 1883, that is about 4½ years. A deposit of pigment specks had taken place on the inner side of the cornea, making a very faint cloud; the bulbar conjunctiva below the cornea was blackened or of a brown color, over a considerable extent, but not so far as the cul de sac. One speck of pigment was upon the caruncle, and a little spot was on the inner surface of the upper lid near the ciliary edge. Besides increase of pigmentation of the conjunctiva and the minute pigment specks in the cornea, nothing abnormal had taken place. There was no thickening of tissue nor any tumor. The corneal locality from which the tumor was taken remained free." H. K.

near the cornea, which grew slowly until equal to one third the circumference of the cornea, $\frac{1}{4}''$ broad, $1'''$ high. From this time on commenced a more rapid growth. The tumor was extirpated, after which the cornea was found intact. The result of the histological examination showed an epithelioma. As eight months thereafter a relapse took place, the globe was enucleated.

Other cases to be added to these are found in the *Arch. für Ophth.* In vol. viii., 1, p. 314, is one reported by Heddæus: Melanotic Tumor on the Corneal Margin.

P. K., fifty-four years old, had on the right eye a black-brown mulberry-like tumor of the thickness of four peas, and of doughy consistency. It covered the outer third of the cornea and the same expanse of the sclera.

The tumor caused no pain, but was inclined to bleed very easily, and had been growing for three years. Vision remained intact. On extirpation of the growth it was seen to be easily separable from the sclera and cornea, and had become attached only in the region of the limbus corneæ and corpus ciliare for a space 6 *mm* long and 1 to 2 *mm* broad. After recovery a yellowish-brown coloration remained at this point.

Two years later the condition of the eye was seen to be still normal.

The microscope revealed epithelial cells with and without pigment, detritus, free pigment, and numerous large round cells, with large nuclei and nucleoli.

In vol. xiv., 3, p. 149, Berthold: Report of Cases of Carcinoma and Sarcoma Occurring at the Corneal Border.

The first case in which the diagnosis of carcinoma of the iris and cornea had been made, proved, on microscopic examination, to be a net-cell sarcoma.

The second case was that of a landed proprietor, fifty-five years old, who had at the outer scleral part of the right eye a tumor which invaded the cornea for $1\frac{1}{2}'''$, and was of a bright-red color and very soft consistency. Its diameter was $4'''$, and the height $1\frac{1}{2}'''$. At the borders it could be partially lifted from the conjunctiva. It had been growing for eight months, but its development had been especially rapid during the last eight weeks. At the operation the growth was found to be so friable that the forceps pushed

through, and it had to be removed with the scissors. The tumor was not grown to the cornea, but was glued to it so firmly that the epithelium of the anterior surface was torn away. The anatomical examination indicated carcinoma.

The third case occurred in a patient fifty-eight years old, who had on the right globe a mushroom growth half the size of a hazel-nut. It extended 2‴ on the sclera, 1‴ on the cornea, and adhered tightly everywhere. The upper surface was whitish, sprinkled with red. The lids could be conveniently closed.

A year before, the patient experienced some pressure at this point; eight weeks before, the tumor was as large as a pin-head, and had since then grown rapidly, but without pain.

The microscopical appearance of this tumor was the same as that of the previous one. A relapse appeared almost immediately at the old spot, and besides this, about 2‴ farther to the outer side, still another and a third nodule, all of which grew rapidly and, histologically, presented the same appearance.

The author then specifies some points as to making the differential diagnosis between carcinoma and sarcoma.

1. The connection of carcinoma with the cornea is more intimate, on account of the more considerable thickness of the epithelial layer. The membrane of Bowman remains long intact in both.

2. The borders of the sarcoma rise abruptly from the cornea and sclera. As the carcinoma is seated like a mushroom on the cornea and sclera, the elevation of the borders is gradual.

3. The tissue of the carcinoma is extraordinarily soft and friable; that of sarcoma is of a firmer consistency.

It appears to us, however, that these points cannot be regarded as generally to be depended upon, so that the diagnosis can be established by them with certainty; in the cases mentioned the authors often enough reported opposite experience. In conclusion he cites the views of Thiersch, Waldeyer, and others: Carcinoma develops through proliferation of epithelium, with increase of the

connective tissue through stimulation thereof. The epithelium does not necessarily originate in glandular substance, but can also develop from the external integument.

*Id.*, vol. xvii., 2, p. 204. Manz: A Melanotic Tumor of the Cornea:

Mrs. G., sixty-five years old, presented herself in December, 1869, with a tumor of the left eye. Her statements were unsatisfactory. She could only say as to the commencement, that the trouble began, two years before, as a streak which extended towards the pupil. The patient saw well up to six months ago. For two months a more rapid growth had been noticed, and now and then hemorrhage had taken place. There was seldom pain, which was confined to the left frontal region. The tumor jutted beyond the palpebral fissure, and was half the size of a nut, 23 *mm* wide. It consisted of four nodules of a grayish-black color and had an uneven, ulcerated surface. The cornea was overlapped on all sides, but they were sharply separated from it. The borders of the tumor could be easily raised. There was smooth healing after enucleation, and up to October, 1870, there had been no relapse.

Microscopical appearance: Between columns of large, wide, spindle cells, spread out like a tree, and containing oval nuclei, are heaped up epithelial nuclei and nucleoli. Other cells were also present which were round, smaller, and contained two to six nuclei. An abundance of blood-vessels; irregular distribution of pigment.

A similar growth, likewise a melanotic tumor, was seen in a man forty-six years old. It was only stated of this tumor that it was located at the corneal margin, reappeared two years after its extirpation, and within eight weeks had grown so rapidly as to cover the upper third of the cornea. After being again removed recovery ensued.

Schneider, in vol. xxii., 3, p. 209, furnishes a contribution to the therapeutics of epithelioma on the sclero-corneal junction.

The right eye of D., a working woman, sixty-eight years old, was inflamed, in May, 1875, to a high degree. Day and night she had severe pains in the entire right side of the head. When she presented herself there was a pear-shaped tumor, the larger portion

of which was situated on the sclera, the smaller on the cornea. The greatest diameters were 9 and 7 *mm.* The surface of the tumor was fissured, warty, and grayish-white in color, the consistency hard and dense. It was not movable over the subjacent parts. The tumor was said to have been the result of a trauma. It began as a small red nodule and caused no annoyance. The diagnosis of epithelioma was made and confirmed through the demonstration of cancroid nests and cones. The treatment consisted in the removal of the tumor; a relapse followed, but after a second removal a cure resulted.

In *von Graefe's Arch. f. Ophth.*, vol. vii., 2, p. 9, there is an article by the editor: Cases of Tumor—Two Cases of Cancroid on the Surface of the Globe.

The first case was that of an officer of middle age, who had been treated by an oculist for a particularly obstinate phlyctenular ophthalmia. A later examination showed a fascicular injection stretching from the periphery to the outer margin of the cornea, at which place there was a swelling 1 line in extent; the height was $\frac{1}{2}'''$. The borders were steep; the surface, looked at with a lens, irregular, somewhat papillary, not ulcerated, and completely dry.

After removal, healing followed in a few days. The above-mentioned injection disappeared at the same time. The examination by Virchow showed the scant connective tissue penetrated in its entire thickness by closely packed epithelial cones. A year later there was no relapse.

The other case was that of a woman, fifty-seven years old. Two years before, she noticed a redness at the outer angle of the right eye, which slowly approached the corneal border and produced a swelling there. Six months later the case came for examination. There was a flat growth which covered over one fourth of the cornea, was $\frac{3}{4}'''$ high, and had sharp, almost perpendicular borders. It hardly extended over the sclera, but continued as a part of the conjunctiva permeated with veins. The color was brownish-gray.

In removing the tumor it was seen to be in intimate connection with the cornea for a space of $1'''$ square, but otherwise lay loose upon it. The conjunctival injection disap-

peared, and a week and a half later the eye again presented a good appearance. This growth was also examined by Virchow and pronounced cancroid. Before the end of a year a relapse appeared.

In *v. Graefe's Arch.*, vol. viii., Althoff describes a case of cancroid of the ocular conjunctiva in a man, which covered almost the entire cornea. He stated that 3½ years before, after taking a cold, he noticed a nodule at the outer border of the cornea. After enucleation of the eye the growth was examined. It was 4 *mm* in height, 19½ *mm* long, and 14½ *mm* broad. The surface was fissured, of a cauliflower nature, and dirty-gray color. The surface of the section presented a dendritical appearance, like an arbor vitæ. Excepting a place (1 *mm* square in extent) where it was united with the substantia propria to its centre, it could be easily pulled off. The cornea was thinned, but the individual layers were normal. The histological examination showed a firm fibrous framework, large blood-vessels, cells of all shapes, large, round or sharp-cornered, club- or spindle-shaped, with one or more nuclei, and often full of fat granules. The cells lay, heaped up in clumps, on the fibres of the network. The neighboring mucous membrane had to be in part removed with it. As it was greatly involved, the danger of recurrence of the disease was so much the greater. The interior of the eye was normal. Seven months later there was no sign of a relapse.

Schmid: Contribution to the Knowledge of Corneal Tumors (*Graefe's Arch.*, vol. xviii., 2, p. 120).

The author mentions four cases; in the three last, however, he only gives the result of examination of the tumors. Of the first case we get also, briefly, the clinical history.

In the first case (that of a Russian peasant) there was a large growth on the left eye, which projected beyond the lids and partly overlapped the latter in its growth. It is ragged, lobulated, of a dark-brown color, and bleeds easily. According to his statements the cause was an injury received a few months previously.

The anterior segment of the globe was removed with the tumor, but as a new growth appeared in the same year,

enucleation was performed. The base of the tumor was 12 *mm* broad, of which 4 or 5 *mm* belonged to the cornea.

Histological examination: In the neighborhood of the tumor, granulation tissue had proliferated into the sclera and substantia propria of the cornea. The growth itself possessed a compact fibrous, arborescently ramifying stroma, rich in blood-vessels. Besides the small cells of the granulation tissue, there were large round ones, with two or more nuclei, belonging to the tumor mass. Besides these, there was pavement epithelium, partly in rows, partly in heaps, which contained a black to light-brown pigment. The second tumor showed exactly the same conditions as the preceding, only that the nucleated round cells predominated over the granulative and epithelial cells. Here also, however, the diagnosis of "carcimona melanodes" was made. The third tumor also showed granulation tissue. An epithelial layer spread out over the the entire periphery of the tumor; at the same time the epithelial layer of the cornea had increased. At the angle where the tumor was seated on the cornea, a large epithelial offset penetrated horizontally into the growth.

This offset showed a covering of cylindrical epithelium in the centre; on the contrary there was pavement epithelium. In addition to this, great quantities of large pavement epithelial cells were found in the growth. The surface showed an uninterrupted stratum of epithelial cells 2 *mm* thick. The anterior elastic lamina could be followed almost to the sclera. The substantia propria and the lamina elastica posterior were normal. The diagnosis was likewise melanotic carcinoma.

The fourth case was one of a pigmented, lobulated tumor, which rested for the greater part on the sclera. On the scleral side the tumor rose abruptly. There had been proliferation of epithelium on the cornea. The lamina elastica anterior could be traced to a point, where an epithelial cone of round and epithelial cells had penetrated into the substantia propria itself. The surface of the growth consisted entirely of pavement epithelium. The lamina elastica posterior was not affected.

# SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FIRST AND SECOND QUARTERS OF THE YEAR 1888.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

S. M. Burnett, Washington. Dantone, Rome; Hirschmann, Charkow; E. Marckwort, Antwerp; P. v. Mittelstädt, Metz; Werner, Dublin; C. H. A. Westhoff; Amsterdam; Schiötz and Ole Bull, Christiania, etc.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

## I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

### —TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

1. Galezowski. Traité des maladies des yeux. Paris, 1888. 3d ed., 1008 pages with 483 illustrations.

2. Hint. Pathology and therapeutics of nervous diseases. First half. Vienna and Leipzig, 1888. The second chapter contains a brief description of the diseases of the optic nerve, and the third chapter a presentation of the diseases of the nerves supplying the muscles of the eye. The anatomical illustrations are worthy of notice and valuable to the oculist.

3. Jessop, Walter. Abstracts of lectures on the physiological and pathological conditions of the pupil and accommodation. Lecture I. On the pupil. *Ophth. Rev.*, 1888, p. 161.

4. Jacob. On simulated diseases of the eye. *Inaug. Diss.*,

Kiel, 1888. The author gives a brief description and criticism of the methods devised for detecting simulated diseases of the eye. It is well adapted for practical purposes.

5. SCHMEICHLER. Contribution to the ocular defects of soldiers. *Der Militärarzt*, 1888, Nos. 4–7.

SCHMEICHLER (5) discusses the optical defects which play an important part in recruiting, and is unreservedly opposed to the wearing of glasses by soldiers.

STATISTIQUE DES AVEUGLES EN RUSSIE EN 1886. St. Petersburg, 1888. These statistics are of the greatest importance ; they show that such an examination of all the blind in the Empire can be carried out.

*b.*—STATISTICAL PAPERS.

6. NINETEENTH ANNUAL REPORT OF THE BROOKLYN EYE AND EAR HOSPITAL FOR THE YEAR 1887. Surgeons—Drs. Matthewson, Prout, and Rushmore.

7. J. J. CHISOLM. Tenth Annual Report of the Presbyterian Eye, Ear, and Throat Charity Hospital of Baltimore for 1887.

8. FARAVELLI e GAZZANIGA. Considerazioni sulle cause della cecità e sulla geografia del tracoma nella Provincia di Pavia. *Ann. di Ottalm.*, vol. xvii., 1, p. 11.

9. FIEUZAL. Compte rendu statistique pour l'année 1887. Compte rendu de la clinique, coup d'œil rétrospectif. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts*, vol. vi., No. 1.

10. JUST. Thirteenth Annual Report of the Ophthalmic Institute at Zittau for the Years 1886 and 1887. Zittau, 1888.

11. MAGNUS. Report on the ophthalmic clinic of Prof. Magnus from April 1, 1887, to April 1, 1888. Breslau, 1888.

12. SECOND ANNUAL REPORT OF THE MAINE EYE AND EAR INFIRMARY, Portland, Me., 1887. E. E. Holt, Surgeon.

13. MASSACHUSETTS CHARITABLE EYE AND EAR INFIRMARY. Sixty-second report, for the year 1887.

14. EIGHTH ANNUAL REPORT OF THE NEWARK CHARITABLE EYE AND EAR INFIRMARY FOR 1887. Drs. Kipp and Rankin.

15. TWENTY-SECOND ANNUAL REPORT OF THE ST. MICHAEL'S HOSPITAL OF NEWARK, N. J.—OPHTHALMOLOGICAL DEPARTMENTS FOR 1887. Dr. T. Y. Sutphen.

16. NEW YORK OPHTHALMIC AND AURAL INSTITUTE. Eigh-

teenth annual report, for the year beginning Oct. 1, 1886, and ending Sept. 30, 1887. New York, 1887.

17. St. Petersburg. Report on the St. Petersburg ophthalmic clinic. No. 2, St. Petersburg, 1888.

18. Schreiber. Fifth annual report on Dr. Schreiber's ophthalmic clinic at Magdeburg for the year 1887. Magdeburg, 1888.

19. Third and Fourth Biennial Reports of the Eye and Ear Clinic at the Central Dispensary of Washington, D. C. Swan M. Burnett, Director. Including a bibliography of the publications of the Director. 1888.

20. Wills Eye Hospital of Philadelphia. Report for the year 1887.

During 1887 there were treated in the Brooklyn Eye and Ear Infirmary (6) 4,443 eye patients. Catract extractions, 11 —Graefe's, and one flap downward without iridectomy.

Burnett.

Number of eye cases treated at the Presbyterian Eye, Ear, and Throat Hospital of Baltimore during 1887, 4,681 (7). Operations, including the minor ones, 927, of which 83 were extractions of cataract. Burnett.

Faravelli and Gazzaniga (8) report on the ophthalmic department and dispensary of the hospital at Pavia from 1884 to 1887 (2,853 patients), and present on two tables the causes of blindness of 193 persons blind in one eye and 53 blind in both. A third table shows the geographical distribution of trachoma in the province of Pavia ; it comprises almost 11 % of the remaining eye diseases, but is the cause of blindness in only 1.03 % of the cases of monocular and in 1.88 % of binocular blindness.

Dantone.

Fieuzal (9) treated, from 1872 to 1880, in all 27,723, and from 1880 to 1887, inclusive, 60,242 eye-patients. In 1887 10,190 patients were treated. Number of extractions, 518—77.22 % with good, 20.07 % with moderate results, 2.71 % failures.

Just (10) treated 3,123 eye patients in 1886, and 3,086 in 1887. He operated 131 uncomplicated cataracts, 128 of them with good results. One eye suppurated. In 2 cases severe iritis ensued. Simple linear extraction was performed in 7 cases ; linear extraction in 2 ; extraction with low frontal flap in 99 cases ; the same operation after artificial ripening in 26 ; the same without opening the capsule in 7.

MAGNUS (11) treated 3,291 new patients. He also presents a review of the eye affections which can be ascribed to constitutional diseases (12.82 %), and of the heredity of myopia. In 37.5 % of all cases of myopia heredity could be assumed.

In the MAINE EYE AND EAR INFIRMARY (12) there were treated in 1887 788 eye patients, and 246 operations were performed (including the minor ones), and of these there were 21 extractions with iridectomy and 4 without, and 3 by suction. One eye was lost. BURNETT.

The number of eye patients in the MASSACHUSETTS EYE AND EAR INFIRMARY (13) during 1887 was 10,085. Among the operations there are reported: 82 extractions of cataract (Graefe), 20 without iridectomy and 9 by the suction method, all systematically arranged by Dr. H. Derby. There was loss of two eyes in those extracted with iridectomy. The length of treatment in those treated antiseptically was 14.8 days; for the others, 22 days. BURNETT.

In the NEWARK EYE AND EAR INFIRMARY (14) there were treated during 1887 2,741 eye cases. Extractions according to Graefe, 11; 5 extractions without iridectomy. BURNETT.

In the OPHTHALMOLOGICAL DEPARTMENT OF ST. MICHAEL'S HOSPITAL (15) there were treated 1,413 eye cases. There were 149 operations, embracing minor ones, of which 7 were extractions after v. Graefe. BURNETT.

In the NEW YORK OPHTHALMIC AND AURAL INSTITUTE (16) 5,141 eye patients were treated. Extraction without iridectomy was performed in 64 cases, in 61 with good, 2 with moderate result, 1 failure. Extraction according to Graefe was performed in 10 cases with good results. BURNETT.

In ST. PETERSBURG (17) 7,984 eye patients were treated from 1879 to 1883. Number of cataracts operated, 595,—533 with good, 12 insufficient result, 50 failures.

SCHREIBER (18) treated 1,900 new patients. Extractions according to v. Graefe, 19, among which 2 failures. The lachrymal sac was removed in 28 cases; 13 exenterations. In 22 cases corneal ulcers were cauterized, in 18 successfully, in 4 not.

In BURNETT'S clinic (19) 2,310 eye patients were treated. Number of operations, 328 (including the minor), among them 12 cataract extractions. Nearly all the major operations were done at the Garfield Hospital and are not included in this report.

There were treated in the WILLS HOSPITAL (20) during 1887 8,737 eye patients. There were 1,427 operations, counting the minor ones, and among them were 82 extractions. BURNETT.

## II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

### *a.*—GENERAL PATHOLOGY.

21. FRIEDENWALD. The visible currrent of blood in newly formed corneal blood-vessels. *Centralbl. f. prakt. Augenhk.*, Feb., 1888.

22. GALLENGA. Del rapporto fra panoftalmite e micro-organismi piogeni. *Rassegna di sci. med.*, vol. iii., 2.

FRIEDENWALD (21) found that in newly formed corneal blood-vessels the current of blood is divided into small sections; he found red columns separated by colorless intervals. These columns sometimes moved irregularly, sometimes steadily.

GALLENGA (22) prepared gelatine cultures with the exudations of ten eyes in a state of panophthalmitis, in some of which enucleation had been performed, in others exenteration, and obtained the following results. In all of the cultures he found the staphylococcus pyogenes albus, 9 in the staphylococcus aureus, 3 in the staphylococcus citreus, 3 in streptococcus pyogenes, and in one a colony of bacilli which resembled those of Passet. In the tissues he found the beginnings of micrococci, but the individual forms could not be distinguished. In three of the diseased eyes there was blennorrhœa of the lachrymal sac. DANTONE.

### *b.*—GENERAL THERAPEUTICS.

23. MOTAIS. Des incisions sur l'équateur et l'hémisphère postérieure du globe. Considérations anatomiques et nouveau procédé opératoire. *Congr. d'ophth.* de Paris, 1888.

23A. STADERINI. Iniezione di calomelano alla tempia; conseguente embolia dell'arteria temporale superficiale e gangrena locale. *Boll. d. Soc. tra i calori delli Sci. med.*, vol. v., 6.

MOTAIS (23) gives accurate directions for choosing the point of incision in ophthalmotomy. Especial care must be taken to avoid the oblique muscles, the ciliary nerves and arteries, and the ciliary body. The area within a radius of 5–6 *mm* around the optic nerve must be avoided on account of the ciliary arteries, also the region within 5–6 *mm* of the cornea on account of the ciliary body. MARCKWORT.

### *c.*—GENERAL DIAGNOSIS.

24. CHONET. De la skiascopie (ancienne kératoscopie). Théorie et application. *Rec. d'ophth.*, 1888, No. 4.

25. CLAIBORNE, HERBERT. Hyperphoria. *N. Y. Med. Journ.*, March, 1888.

CLAIBORNE (25) thinks the manner of designating hyperphoria introduced by Stevens deficient in exactness. He thinks the deviation should be designated by the muscle (superior or inferior rectus) that is at fault, whether it be too strong or too weak as compared with those of the other eye. When the deviation is upward it is called vicious hyperphoria. Attention is also called to the fact that in many persons the eyes do not lie in the same horizontal plane, and the influence of this condition in the production of hyper- and hypophoria. BURNETT.

26. STRAUB. A solution of fluorescine as a diagnostic aid in affections of the cornea. *Centralbl. f. prakt. Augenhk.*, March, 1888.

The author calls attention to the fact that the uninjured cornea does not absorb fluorescine, but does so when the epithelium is gone. This fact he utilizes to determine the regeneration of the epithelium, as well as for the diagnosis of loss of epithelium in general.

## III.—INSTRUMENTS AND REMEDIES.

### *a.*—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

27. BURNETT, S. M. A modification of the refraction ophthalmoscope with an attachment for using cylindrical glasses. *Trans. Amer. Ophth. Soc.*, 1887.

28. DOYNE, R. W. A new stereoscope. *Ophth. Rev.*, 1888, p. 65. Intended for the orthopædic treatment of strabismus.

29. GILLET DE GRANDMONT. Périoptométrie et chromatopsie. Périmètre et chromatoptomètre. *Arch. d'ophth.*, vol. viii., No. 3, 1888.

30. KROLL. Stereoscopic pictures. 2d ed. Hamburg and Leipzig, 1888. The favorable criticism passed upon the first edition of these pictures was justified by the speedy appearance of a second edition.

31. LEROY and DUBOIS. Un nouvel ophthalmomètre pratique. *Rev. génér. d'ophth.*, 1888, No. 2.

32. RISLEY, S. D. A modified form of ophthalmoscope, with cylinders. *Trans. Amer. Ophth. Soc.*, 1887.

33. STEPHENSON, SYDNEY. Wolfberg's color-test. *Brit. Med. Journ.*, May, 1888, p. 1111.

34. WILMER, W. H. Levelled abducting prisms. *N. Y. Med. Rec.*, March 17, 1888.

BURNETT'S (27) modification consists in the addition of a clip behind the disc containing the lenses, into which the cylinders from the trial case can be put when needed. He also has a plane circular mirror, and swung in front of this, a tilting concave mirror. When it is desired to use the plane mirror alone, the tilting mirror can be detached from the upper bearing and fastened out of the way below. The discs give 25 minus and 22 plus spherical lenses. BURNETT.

In order to make a rapid and accurate determination of the field of vision possible, GILLET DE GRANDMONT (29) has improved the self-registering perimeter which he designed in 1881, and with the aid of two illustrations presents an accurate description of it, which cannot be condensed into a few words. Four objects move simultaneously along the four arms of the perimeter set at right angles to one another and movable about a common axis; the patient must then say where he sees the objects, above, to the right, etc., thus preventing the eye more readily from leaving the point of fixation. To determine the margin of the color-field, four different colors are placed upon the four branches of the perimeter without the knowledge of the patient, and moved simultaneously towards the point of fixation until all the colors are correctly named. The point in question can easily be verified by repetition. He expresses the extent of the visual field in four meridians with the aid of a number of four digits, the individual numbers of which correspond each time to a certain meridian, and, by leaving off the o°, indicate the angle, thereby making the differences among the visual fields readily apparent. For details see the original. Central color-perception the author tests with the chromatoptomètre, which he also illustrates and describes, in which he presents color-squares 2 *cm* square to the eye in a downward direction, the size of the square being decreased with the aid of a slide until the limit of perception is reached. He illustrates with the aid of normal color-fields and gives tables of the normal power of central color-perception. It is worthy of note that the author did not find any increase in the extent of the visual field when he eliminated the effect of the nose, brow, etc., by altering the position of the head, a fact which he explains by assuming that the corresponding parts of the retina are not sufficiently trained. MITTELSTÄDT.

LEROY and DUBOIS (31) have constructed a new ophthalmomètre, partly after that of Hehnholtz, partly after that of Javal-Schiötz. It is said to possess the advantage over that of Javal-Schiötz of being cheaper, more accurate, easily handled, and adapted to every kind of illumination. MARCKWORT.

RISLEY'S (32) modification consists in placing cylinders in the slides in the handle of the instrument after the manner of Jackson, to be used in connection with the spherical lenses in the ordinary disc. BURNETT.

STEPHENSON (33) has tried Wolfberg's method of determining refraction in numerous cases, but could not confirm the results obtained by the latter, and therefore criticises the whole method unfavorably. The *Brit. Med. Jour.* accordingly condemns the method, basing its judgment on the results of Stephenson and Herzog.

WILMER (34) places a small spirit-level above the nose-piece of an ordinary spectacle-frame holding prisms with their bases inward, in order to determine whether the prisms are perfectly horizontal. BURNETT.

### *b.*—REMEDIES.

35. NICOLAI. Het weetkzame bestanddeel der Jequirity-Zoder. Feestbundel Donders Jubiléum, Amsterdam, 1888. The dependence on micro-organisms in the jequirity infusion for its efficacy as was ascribed by Sattler, has been proved erroneous by Hippel. The paper of NICOLAI (35) confirms this, showing that the action of jequirity is chemical and not dependent upon the presence of micro-organisms. He found that the bacilli do not produce conjunctivitis, have no effect upon the development of the active principle, and are incapable of killing frogs. He obtained from the seeds a chemical substance acting like a ferment, a so-called enzyma, by treating the seeds with phosphoric acid, neutralizing with lime-water, and purifying with a solution of cholesterine in alcohol and ether. He thus obtained a white amorphous substance, which had the power of producing conjunctivitis, lost it in contact with borax, but not in contact with ether, chloroform, phosphoric acid, boracic acid (3 %), hydrochloric acid and sublimate 1: 10,000, which does not act as diastase, pepsine, or rennet ferment, and is a powerful poison when brought into the blood. WESTHOFF.

36. PURTSCHER. The application of creoline in ophthalmol-

ogy. *Centralbl. f. prakt. Augenhk.*, March, 1888. A 1 % solution of creoline possesses powerful antiseptic properties, and does not produce any lengthy irritation.

37. SCHIESS. The use and abuse of collyria. *Correspondenzbl. f. Schweizer Aerzte*, vol. xviii.

38. STADERINI. Le injezioni ipodermiche di pilocarpina nella terapia oculare. *Morgagni*, vol. xxx., 1888.

The following reviews refer to anæsthetics, the first of which is

## *Erythrophleïne.*

39. ALT, A. The new local anæsthetic—hydrochlorate of erythrophleïne. *Amer. Journ. of Ophth.*, Feb., 1888.

40. BERNHEIMER. Contribution to the knowledge of the anæsthetic effect of muriate of erythrophleïne. *Klin. Monatsbl. f. Augenhk.*, March, 1888.

41. GASPER. L'érythrophléine. *Progr. méd.*, 1888, p. 139.

42. GOLDSCHMIDT. Erythrophleïne as an anæsthetic. *Centralbl. f. klin. Med.*, 1888, p. 121.

43. HIRSCHBERG. Erythrophleinum hydrochloricum. *Centralbl. f. prakt. Augenhk.*, Feb., 1888.

44. KAPOSI. Erythrophleïne, the new anæsthetic. *Wiener med. Wochenschr.*, 1888, No. 9.

45. KAREWSKI. Erythrophleïne. *Deutsche med. Wochenschr.*, 1888, p. 143.

46. KAZAUROW. The action of the muriate of erythrophleïne on the normal eye. *Wratsch*, 1888, No. 9.

47. KOLLER. Erythrophleïne. *Wiener med. Wochenschr.*, 1888, No. 6.

48. KÖNIGSTEIN. Experiments with erythrophleïne. *Internat. klin. Rundschau*, 1888, No. 8.

49. LEWIN. On a local anæsthetic. On the Hoya poison. *Deutsche medicinal-Zeitung*, 1888, No. 6.

50. LIEBREICH. On the action of the N'Cassar bark and erythrophleïne. *Deutsche med. Wochenschr.*, 1888, No. 7.

51. PANAS. Sur la valeur de l'érythrophléine en ophthalmologie. *Arch. d'ophth.*, vol. viii., 2, 1888.

52. v. REUSS. The action of erythrophleïne on the human eye. *Internat. klin. Rundschau*, 1888, No. 8.

53. SCHMIDT-RIMPLER. Anæsthesia of the eye produced with muriate of erythrophleïne. *Berlin. klin. Wochenschr.*, 1888, No. 14.

54. TROUSSEAU. L'érythrofleïne. *Bull. de la clin. nat. ophth. del' hosp. des quinze-vingts*, vol. vi., 1, 1888.

55. TWEEDY. Erythrophleïne. *The Lancet*, Feb. 4, 1888.

56. VENTMINI e GASPORINI. Sugli effetti anestetici delle elleboreina. *Bull. d'ocul.*, vol. x., Nos. 6 and 7.

57. WELCKER. Experiments with muriate of erythrophleïne. *Centralbl. f. prakt. Augenhk.*, Feb., 1888.

The results obtained by the authors named above in regard to erythrophleïne agree with those first reported by LEWIN (49). The latter found that a 0.2 % solution instilled into the eyes of rabbits and cats produces an anæsthesia after 15–20 minutes which lasts a day to a day and a half. Even solutions of 0.1 and 0.05 % produce this result. Concentrated solutions produce symptoms of severe irritation and intense opacity of the cornea. KOLLER (47) tried the remedy upon himself with a 0.125 % solution, and found that this solution also greatly irritated his eye. The anæsthesia lasted a long time, but the eye was very painful at first, and the cornea became so dull that for two days he could not read with that eye. HIRSCHBERG (43), SCHMIDT-RIMPLER (53), BERNHEIMER (40), and others had similar results with patients. TWEEDY (55) alone had negative results, but as he is the only one, they were probably due to errors. All authors agree that erythrophleïne is inferior to cocaine, and therefore will not hold a lasting position in ophthalmology.

### *Cocaine.*

58. TARTUFERI. Sul cloromercurato di cocaina e sul suo potere antisettico. *Ann. di ottalm.*, vol. xvi., 5, 6.

59. TSCHERNOMORDIK. The question of the effect of muriate of cocaine on the cornea. *Russkaya med.*, 1888, No. 5. Refutation of the assertion of Dr. Wadsinsky, that cocaine does not act upon the cornea.

60. WICHERKIEWICZ. The application of cocaine in ophthalmic surgery. *Allg. Wiener med. Ztg.*, 1888, No. 1, and *Pozeglad Lekarsky*, 1888, Nos. 47 and 48.

TARTUFERI (58) shows that in the formula given by Sattler—cocain. hydrochlor. 5.0, hydrarg. bichlor. corr. 0.02, aq. destill.

100.0, to obtain a collyrium which is both an antiseptic and an anæsthetic—the corrosive sublimate combines with a part of the cocaine and forms a new salt (sublimate-cocaine, $C_{17}H_{22}NO_4$-$ClHgCl_2$), which possesses scarcely any antiseptic properties, as attempts at sterilization with it have shown. DANTONE.

WICHERKIEWICZ (60) has not observed any more the corneal affection described by Bunge, since he instils the cocaine (5 %) only once or twice just before the operation. He recommends subconjunctival injections of cocaine, 3–5 %, in a weak solution of sublimate (1 : 10,000). In the removal of subconjunctival growths or orbital neoplasms the solution is injected into the orbital tissue or into the tumor itself ; in enucleation of the eyeball it is best to inject in the direction of the four recti muscles ; in operations on the lids, under the skin of the latter. The quantity injected never exceeded 1½ syringefuls. Symptoms of intoxication were rarely observed. HIRSCHMANN.

## IV.—ANATOMY.

### *a.*—GENERAL ANATOMY.

61. HERRNHEISER. On congenital microphthalmus. *Prager med. Wochenschr.*, 1888, No. 12.

62. SALTINI. Contribuzione clinica allo studio delle anomalie congenite dell' occhio. *Boll. d'ocul.*, vol. x., Nos. 10 and 11.

63. VALUDE et VASSAUX. Note sur l'œil d'un cyclope. *Arch. d'ophth.*, 1888, vol. viii., No. 1.

HERRNHEISER (61) describes 6 cases of congenital microphthalmus. The description contains nothing new.

SALTINI (62) describes, among other congenital ocular defects, a diffuse corneal opacity in both eyes, which he observed in three brothers and sisters, and which he considers the remnant of an interstitial intra-uterine keratitis ; also a case of congenital uniocular microphthalmus with shrunken cataract and marked prolongation of the ciliary processes, and limitation of mobility inward.

The cyclopian eye examined by VALUDE and VASSAUX (63) consisted of a single spherical sclera, a double dumb-bell-shaped cornea, two irides, and two lenses. From this the authors conclude that the ectoderma forming the lens and that part of the mesoderma forming the uveal tract are differentiated at an earlier date than that part which forms the sclera. On the lids, which

were essentially normal, there was only one lachrymal canal which did not reach the lachrymal sac, which seems to the authors to confirm the hypothesis of Kölliker, that the beginning and end of the lachrymal canal develop separately. The canal therefore develops from the conjunctiva. (The posterior portion of the eye, with the optic nerve, had been left in the orbit.)

V. MITTELSTÄDT.

### *b.*—RETINA.

64. FALCHI. Sull' istogenesi della retina e del nervo ottico. *Ann. di ottalm.*, vol. xvi., Nos. 5 and 6.

65. RAMPOLDI. Sulla fina anatomia dell' interno limite della retina dei mammiferi. Nota preventiva. *Ann. di ottalm.*, vol. xvii., 1.

66. TARTUFERI. Sulla istologia della retina. *Ann. di ottalm.*, vol. xvi., Nos. 5 and 6.

FALCHI (64) describes the results of his investigations of the histological development of the retina and optic nerve in the embryo of mammals.

RAMPOLDI (65), in a preliminary notice, reports on a nerve-plexus discovered by him at the very limit of the retina. It lies between the retina and vitreous and has the appearance of a very delicate membrane. DANTONE.

TARTUFERI (66) reports his latest microscopical investigations of the retinal elements, after he had succeeded in coloring the retina black according to Golgi's method (combined action of bichromate of potassium and nitrate of silver).

## V.—PHYSIOLOGY.

### *a.*—GENERAL PHYSIOLOGY.

67. MAYER. The position of the book in writing. *Friedreich's Bl. f. gerichtl. Med.*, 1888, No. 2.

68. TSCHERNING. Bidrag til det menneskelige Dioptrik. *Nord. ophth. Tidsskrift*, 1, 2, 1888.

MAYER (67) has arrived at the following results: Writing is accomplished by the combined action of the right upper extremity and the eyes. Both factors, however, are not subject to rigid laws, but the range within which writing can be accomplished is very extensive. That of the eyes is larger than that of the arm and hand, and the former will therefore more commonly adapt

themselves to the latter than vice versa. The best method of writing, from a theoretical point of view, is that in which the eyes and hand work together in such a manner that neither over-exertion of the former nor a bad position of the body will easily result. The sooner the latter event takes place, the poorer the method of writing. Of the various methods, the upright position of the writing, with the book placed directly in front, satisfies all the demands of the eye and hand. Slanting writing is best when the book is inclined, making an angle of 30°–40° opening to the right. A greater angle is injurious to the carriage of the body ; a smaller one soon causes the book to be pushed to the right ; otherwise the writing cannot be slanted sufficiently. For the eyes and the carriage of the body the inclined position is not as good as the horizontal. Placing the book to the right has generally been condemned as injurious both to the eyes and to the carriage of the body. The favor which they enjoy must be ascribed to the freedom which they give to the hand.

TSCHERNING (68) remarks as follows on the oblique position of the lens in its relation to the lines of sight : the lines of sight are never perpendicular to the surface of the lens. In the eyes which he examined the lens was always turned outward in its relation to the line of vision (3°–7°). He also found, as a rule, that the lens had been turned about its horizontal axis, so that the upper edge was tilted forward (less frequently backward) ; this torsion sometimes amounted to 3° and more. This obliquity of the lens causes a myopia which may reach 0.5 D and 0.25 D of astigmatism, the horizontal meridian possessing the greater curvature.

### *b.*—COLOR-PERCEPTION.

69. ARMSTRONG. Color-blindness in the mercantile marine of the United States. *Brit. Med. Jour.*, Jan. 28, 1888.

ARMSTRONG (69) reports that 2.3 per cent. color-blind were found in the United States mercantile marine with Holmgren's tests.

Sections VI.–XI. Reviewed by DR. HORSTMANN.

## VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

70. COHN, H. Remarks on school-hygiene in Constantinople. *Zeitschr. f. Schulgesundheitspflege*, 1888.

71. CUIGNET. Des règles à suivre pour le choix des verres

correcteurs des amétropies. *Rec. d'oph.*, 1888, No. 2, p. 65. Nothing new.

72. GALLENGA. Dimonstrazione practica dell'azione secondaria delle lenti convesse. *Rassegna di sci. med.*, vol. iii., 6.

73. GREEN, JOHN. On a transient myopia occurring in connection with iritis. *Trans. Amer. Ophth. Soc.*, 1887.

74. HARPER, JOHN E. The causative connection of ametropia to ocular diseases. *Jour. Amer. Med. Ass'n*, Jan. 14, 1888.

75. HOSCH. Uniocular paresis of accommodation with mydriasis in inveterate syphilis. *Correspondenzbl. f. Schweizer Aerzte*, 1888, No. 4.

76. MARTIN, G. Migraine et astigmatisme. *Ann. d'ocul.*, vol. xcix., pp. 24 and 105.

77. RISLEY, S. D. Hypermetropic refraction passing into myopia while under observation. *Trans. Amer. Ophth. Soc.*, 1887.

78. SALTINI. Sulla myopia nelle scuole di Parma. *Ann. di ottalm.*, vol. xvi., 5–6, p. 471.

79. SCHNELLER. The development and treatment of myopia. *Danziger Ztg.*, 1888.

80. SEGGEL. The question of myopia. *Münchener med. Wochenschr.*, 1888, No. 2.

81. SILEX, P. Report on the first ophthalmic examination of the inmates of the Rummelsburg Orphan Asylum. Berlin, 1888.

82. STILLING, J. The shape of the skull and myopia. Wiesbaden, 1888, J. F. Bergmann. 124 pp.

83. THEOBALD, SAM'L. Notes of two cases of reflex paralysis of accommodation with mydriasis due to dental irritation, with observations on their supposed bearing upon the question of the pathogenesis of sympathetic ophthalmia. *N. Y. Med. Rec.*, Feb. 25, 1888.

84. WEISS, L. Contributions to the anatomy of the orbit. Tübingen, 1888, H. Laupp. 176 pp.

COHN (70) found very few myopes in the schools of Constantinople. This he is inclined to attribute to the small amount of writing and the manner in which it is performed.

GREEN (73) reports that while recovering from an acute attack of double iritis he found that he had become myopic 1 to 1.5 D, which gradually passed away in the course of about six weeks.

BURNETT.

HARPER (74) relates three cases of severe conjunctival and corneal inflammation which were apparently due to the strain caused by hyperopic astigmatism. Correcting glasses gave permanent relief. BURNETT.

HOSCH (75) reports five cases of uniocular paresis of accommodation in inveterate syphilis, which could not be cured.

MARTIN (76) tries to prove in a long paper that hemicrania is an arthritic disease which only appears in cases of partial contraction of the ciliary muscle. In the majority of patients the static astigmatism is corrected by a partial contraction. When this astigmatism is not present or not well marked, we find spastic contraction. Among 352 patients suffering with hemicrania he found 285 in whom the static astigmatism was corrected by the contraction of the ciliary muscle, while he only found 67 cases of spastic contraction. In 66 cases the astigmatism corrected equalled 0 25 D, in 121 0.50 D, in 7.7 0.75 D, in 18 1 D, in 2 1.25 D, in 1 1.50 D. In 7 cases the spastic contraction equalled 0.25 D, in 33 0.50 D, in 18 0.75 D, in 9 1.00 D. When only one eye is astigmatic, the hemicrania is confined to that side. In proof of these views he reports a large number of clinical histories. He distinguishes between a "migraine vulgaire" and a "migraine ophtalmique." From the paper in question it becomes evident that his former one (*Ann. d'ocul.*, vol. xcix., p. 24) refers only to the "migraine vulgaire." He now makes the same assertions in regard to the "migraine ophtalmique." The development of migraine depends upon three factors: 1, a constitutional anomaly, arthritis; 2, partial contraction of the ciliary muscle; and 3, upon accidental causes, varying with each case. In proof Martin quotes a number of clinical histories and concludes from them as follows: "Our theory of astigmatism as the cause of migraine ophtalmique therefore rests upon a number of proofs: first, upon the constancy of the astigmatic contraction; secondly, upon the confinement of unilateral migraine to the side of this contraction; and, finally, to the good effect of cylindrical glasses. MARCKWORT.

RISLEY (77) reports nine additional cases to the thirteen he has already recorded in the Transactions of the Society, in which he has observed the hyperopic pass into the myopic refraction. He makes the statement that "without exception they passed from the shallow hypermetropic eyeball over into the lengthened eyeballs through the turnstile of astigmatism." BURNETT.

SALTINI (78) examined in Parma 954 school children of both

sexes and found among them 24.64 % myopes. In only 15.75 % of the latter a hereditary disposition could be shown. Between the age of 11 and 12 there was myopia in 13 %, between 13 and 18 in 27 %, and over 20 in 29 %. Measurements of the skull in addition to the 548 previously made gave the following results: among 389 myopes there were 14.6 % dolichocephalous, 22.42 % mesocephalous, and 62.98 % brachycephalous skulls; among 985 emmetropes there were 9.63 % dolichocephalous, 18.17 % mesocephalous, and 71.46 % brachycephalous skulls; among 128 hypermetropes there were 10.49 % dolichocephalous, 19.52 % mesocephalous, and 69.35 % brachycephalous skulls. DANTONE.

According to SCHNELLER (79) myopia is due in 12 % to an increased curvature in the refractive media, and in 88 % to a lengthening of the axis of the globe.

SILEX (81) found among 702 eyes 305 emmetropic, 245 hypermetropic, 65 myopic, and 87 astigmatic.

STILLING (82) has measured the skulls of many persons and found that a low orbit is usually associated with myopia, a high orbit with hypermetropia and emmetropia. Brachycephalia predisposes to myopia, and dolichocephalia to hypermetropia.

THEOBALD (83) relates the histories of two cases of reflex paralysis of accommodation and mydriasis from decayed teeth and adduces the facts in support of his theory on the reflex production of sympathetic ophthalmia, published in these ARCH., vol. xviii., No. 1. BURNETT.

WEISS (84) made anatomical investigations as to the causes of myopia, and found that the optic nerve is not exposed to any strain by the movements of the eyes when the piece extending from the anterior end of the optic canal to the insertion at the globe is long, but that such strain results when this piece is short. This strain accounts for the tissue-changes at the extreme end of the optic nerve. When, however, the growth of the body has ceased, the influence of this strain as a cause of myopia ceases.

## VII.—LIDS.

85. ADAMÜCK, E. A remarkable anomaly of motility of the lids and eyes. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxvi., p. 191.

86. ALLPORT, FRANK. An operation for simple forms of entropium. *Amer. Jour. Ophth.*, vol. v., 3, p. 78.

87. BOUCHERON. Opération nouvelle pour l'ectropion. *Soc. franç. d'ophth.*, 1888.

88. Germann, Th. The treatment of trichiasis and distichiasis due to entropium. *Mittheil. aus d. Petersb. Augenheilanst.*, 1888, No. 12, p. 62.

89. Hewkley, T. Fugitive iodism; œdema of eyelids. *Brit. Med. Jour.*, 1888, p. 1160.

90. Hotz, F. C. The reposition of the edge of the lid in trichiasis of the upper lid. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxvi., p. 98.

91. Huneke. Ectropium operation by transplantation of epidermis after Eversbusch. *Münchener med. Wochenschr.*, 1888, No. 15, p. 250.

92. Jacobson, J. The intermarginal incision with and without transplantation of skin in the therapy of diseases of the edge of the lid. *Beiträge zur Pathologie des Auges.* Leipzig, 1888, W. Engelmann, p. 93.

93. McKeown. Spastic entropion treated by stretching the orbicularis. *Brit. Med. Jour.*, Jan. 7, 1888, p. 19.

94. Van Millingen. De la guérison radicale du trichiasis par la tarso-cheilo-plastie. *Arch. d'ophth.*, vol. viii., 1, p. 60.

95. Pedraglia and Deutschmann. Chronic œdema of the lids in inflammation resembling erysipelas, with formation of tumors at the edge of the lids. *Graefe's Arch. f. Ophth.*, vol. xxxiv., 1, p. 161.

96. Richey, S. O. Eczema simplex dependent upon ametropia. *Chicago Med. Jour. and Exam.*, April, 1888.

97. Robinson, Thos. Fugitive œdema of eyelids. *Brit. Med. Jour.*, 1888, No. 1428, p. 1006.

98. De Vincentiis. Caso di cancro delle palpebre. *Ann. di ottalm.*, vol. xviii., p. 64.

99. Wicherkiewicz, B. A sure operative treatment for trichiasis and distichiasis. *Berlin. klin. Wochensch.*, 1888, No. 6.

100. Williams, A. D. Epithelioma apparently cured by gasoline. *St. Louis Med. and Surg. Jour.*, vol. lix., No. 3, p. 178.

101. Williams, A. D. A new operation for entropium. *St. Louis Med. and Surg. Jour.*, vol. lix., No. 2, p. 106.

Adamück (85) observed in a man aged forty a rising and drawing back of the lids with every movemeut of the jaws, so that the eyes became more and more prominent. When the

chewing ceased the eyes gradually returned to their normal position.

BOUCHERON (87) recommends for senile ectropium of the lower lid excision of the tarsus, which is performed from the conjunctiva. A strip of tarsus one *mm* wide is left behind. In total ectropium the whole tarsus is excised (with the exception of the strip mentioned), in partial ectropium only a portion.

MARCKWORT.

GERMANN (88) recommends a modified Snellen-Hotz operation in cases of entropium combined with trichiasis and districhiasis.

HEWKLEY'S (89) patient, a man aged thirty, had used iodide of potassium on account of frontal neuralgia. A severe coryza ensued, which ceased after an hour, and was followed by swelling of the lids of the left eye, lasting two days. WERNER.

In trichiasis of the upper lid, HOTZ (90) divides the skin at the upper edge of the tarsus, removes a strip of muscle a few *mm* wide, and thus exposes the upper edge of the tarsus. Then he detaches the remainder of the pars ciliaris and the orbicularis muscle in connection with the skin from the tarsus down to the roots of the eyelashes. Just above the latter he makes a transverse cut through the cartilage to the posterior edge of the lid. Above this he makes another cut, the distance of which from the other depends upon the size of the piece of tarsus to be excised. The second cut passes diagonally downward, meeting the other at an acute angle at the posterior edge of the lid. In this manner he excises a wedge-shaped piece of cartilage. Three or four sutures are then applied by passing the needle through the edge of the lower incision through the lid, then through the upper edge of the tarsus, and finally through the upper edge of the incision through the skin. [The Streatfeild-Snellen operation without excision of skin. H. K.]

HUNEKE (91) covered a large defect of the upper lid due to lupus with four or five smaller and eight or nine larger pieces of skin according to Eversbusch. The result was excellent.

JACOBSON (92)makes an intermarginal incision 6–8 *mm* long in trichiasis. Then he takes a strip of skin from the temporal end and fastens it in the intermarginal space.

MCKEOWN (93) treated an entropium of the upper lid in an old lady suffering with conjunctivitis by keeping the lids apart with the speculum for a minute.

VAN MILLINGEN (94) operates for trichiasis by dividing the

edge of the lid between the lashes and Meibom's glands, thus making a wound 2–3 *mm* wide and becoming narrowed towards the sides, into which he transplants a corresponding strip of mucous membrane from the lips, keeping it in position with a bandage. He began to operate according to this method in 1877, and has used it exclusively for the last three years. He claims priority against Jacobson and Burchardt, basing his claim on his publications in 1877 and 1882. v. MITTELSTÄDT.

PEDRAGLIA and DEUTSCHMANN (95) found peculiar formations resembling tumors at the edges of the lids, which they think developed from the secretion of Meibom's glands, the glands of the eyelashes, or the sebaceous glands of the edge of the lid respectively.

RICHEY (96) reports a second case of eczema on the malar prominence, which seemed due to ciliary strain, and which disappeared on the correction of 2 D of H. BURNETT.

ROBINSON (97) saw in a woman aged 46 fugitive œdema of the lids, which lasted 2 or 3 days. She suffered with headache and frequent attacks of erysipelas of the face.

DEVINCENTIIS (98) describes a case of epithelioma of the lower lids which had probably taken its origin in Meibom' glands. DANTONE.

In operating for trichiasis and distichiasis Wicherkiewicz (99) first divides the edge of the lid, the anterior portion containing the skin, muscles, and lashes, the posterior the tarsus and conjunctiva. He then attaches the free ciliary margin to the loose tissue covering the tarsus with 3 sutures. He then transplants a piece of skin, which he excises from the upper lid, into the intermarginal space.

## VIII.—LACHRYMAL APPARATUS.

102. ALBINI, E. Sulla dacrioadenite sifilitica. *Ann. di ottalm.*, vol. xvi., 5–6, p. 501.

103. DESPAGNET. Des tumeurs malignes de la caroncule. *Rec. d'ophth.*, 1888, No. 1, p. 37.

104. DOLGENTHOW, W. Rare case of petrifaction of a hypertrophic fœtal caruncle of the right eye. *Wjestnik Ophth.*, vol. v., 1, p. 19.

105. GRÜNHUT, R. Two cases of concretions of fungi in the lower lachrymal canal. *Prager med. Wochenschr.*, 1888, No. 33.

106. MOAURO. Angio-mixo-sarcoma bilaterale del sacco lagrimale con degenerazione jalina delle pareti vasali. *Riv. Ven. d. sci. med.*, 8818.

107. NOYES, H. D. Spontaneous prolapse of the lachrymal gland—its extirpation. *Trans. Amer. Ophth. Soc.*, 1887.

108. SCHEFF, J. The differential diagnosis of the fistula of the cheek and gums below the inner canthus, and the lachrymal fistula. *Wiener med. Wochenschr.*, 1888, No. 12.

109. WIDMARK, J. Nagra bacteriologisk-optalmiatriska studier. *Nord. Ophth. Tidsskrift.*, 1888, Nos. 1 and 2.

ALBINI (102) observed a tumor of the lachrymal gland in a syphilitic young woman. It was removed. It was 23 *mm* long and 12 *mm* wide; the microscopic examination showed that the glandular elements, with the exception of a few peripheric portions, had been replaced by young but already organized connective tissue. He found a few giant cells, but no Lustgarten bacilli.

DANTONE.

DESPAGNET (103) gives a clinical and anatomical description of two tumors of the caruncle; a melanotic epithelioma and a sarcoma. They were pedunculated and could be easily removed. The wound was cauterized after removal. Five months later there had been no relapse, nevertheless Despagnet is doubtful on this point. The anatomical examination shows that tumors of the caruncle are not so benign as is generally supposed.

MARCKWORT.

GRÜNHUT (105) reports two cases in which he found streptotrix Försteri in the lower lachrymal canal.

NOYES' (107) patient was a girl 20 years of age, who nine years ago had noticed a soft movable tumor under the right upper lid. The other eye had been lost by an accident, but no injury had occurred to the right. The character of the tumor was unsuspected until its removal, when it was found to be the lachrymal gland. The healing was prompt and no unpleasant effect followed.

BURNETT.

According to SCHEFF (108) the fistula of the cheek and gums is distinguished from the lachrymal fistula by the fact that the former is never situated exactly at the infraorbital margin, but below it. The fistula can be probed only downward and backward.

In order to study the effect of the bacteria of the lachrymal sac upon the healthy conjunctiva and lachrymal sac, WIDMARK (109)

introduced the lachrymal secretion from three patients into the eyes of healthy persons, 7 times in all. With the exception of slight lachrymation and injection lasting a few hours, no change was noticed. The author, therefore, thinks that the bacteria are harmless when the conjunctiva and lachrymal sac are healthy; he assumes that an obstruction to the escape of the tears may perhaps be the cause. Since publishing his paper in "Hygiea," 1887, he has made cultures in two cases of serpent ulcer, finding in one the streptococcus pyogenes, in the other another micrococcus. He has also examined 25 cases of blepharadenitis and always found the streptococcus pyogenes. When gelatine containing bacteria is introduced into a pocket-like wound of the conjunctiva of the globe, a pustule is the result. When a culture emulsion of staphylococcus pyogenes is injected under the conjunctiva, a local infiltration with catarrh of the conjunctiva ensues. The author thinks that the plyctenula and blepharadenitis are due to infection, the same micro-organism being the cause in both. SCHIÖTZ.

## IX.—MUSCLES AND NERVES.

110. ABADIE. De l'opération du strabisme. *Soc. franç. d'ophth.*, 1888.

111. BULL, C. S. Passive motion in the treatment of paralysis of the ocular muscles. *Trans. Amer. Ophth. Soc.*, 1887.

112. EALES, H. Anæsthesia during strabismus operations. *Brit. Med. Jour.*, Feb., 1888, p. 349.

113. FROST, A. On some points connected with concomitant convergent squint. *Brit. Med. Jour.*, Apr., 1888, p. 783.

114. JAVAL. Sur le traitement orthoptique du strabisme. *Soc. franç. d'ophth.*, 1888.

115. LANDOLT, E. La vision binoculaire après l'opération du strabisme. *Arch. d'ophth.*, vol. viii., 1, p. 34.

116. LIPPINCOTT, J. A. Sharply circumscribed hyperæmia occurring in connection with muscular insufficiency. *Trans. Amer. Ophth. Soc.*, 1887.

117. SMITH, PRIESTLEY. Cocaine in squint operations. *Brit. Med. Jour.*, Feb., 1888, p. 74.

118. TILLEY, ROBERT. Monocular diplopia without manifest lesions of the affected eye. *Jour. Amer. Med. Assoc.*, March 17, 1888.

119. WADSWORTH, O. F. A case of recurrent paralysis of the motor oculi. *Trans. Amer. Ophth. Soc.*, 1887.

ABADIE (110) recommends tenotomy combined with advancement in cases in which the strabismus exceeds 3–4 *mm*. He thinks that an orthoptic treatment is useless. The correctness of his assertion was denied to a greater or less extent by all who took part in the discussion. Galezowski is opposed to the advancement of Tenon's capsule. Boucheron thinks that in very young children mydriatics or myotics aid the orthoptic exercises.

MARCKWORT.

BULL (111) reports 21 cases in which he tried passive motion in the treatment of paralysis of the various external ocular muscles in the manner first proposed by Prof. Michel. The paralysis was entirely cured in 8 cases, improved in 6, and not benefited at all in 7. BURNETT.

EALES (112) uses nitrous-oxide gas as an anæsthetic in operating for strabismus.

FROST (113) discusses the relation of convergence and accommodation to squint. In most cases amblyopia of the squinting eye is the cause. In alternating strabismus there is a preponderance of the internal recti. WERNER.

JAVAL (114) shows a stereoscope constructed by Bull for the measurement of strabismus and for exercises. Landolt recommends for the purposes of measurement the observation of the reflex of the deflected cornea upon a scale. According to Vacher the orthoptic treatment is useless when the image cannot be united with a prism at 4°. Dor measures the deviation with prisms; a muscular insufficiency of more than 10° he considers too great for orthoptic treatment. According to Meyer, the benefit derived from stereoscopic exercises is undeniable when the strabismus has existed only a short time. Landolt recommends orthoptic exercises especially after the operation. Boucheron calls attention to the inconstancy of the degree of deviation. The strabismus is composed of a fixed and a variable portion; the latter is neutralized by mydriatics. According to Abadie, exercises improve vision only slightly; binocular vision is obtained by the operation, no orthoptic exercises being necessary for that purpose. Javal reports two clinical histories to demonstrate the usefulness of stereoscopic exercises. By exercising the internal recti, deviations of 15° to 20° can be corrected.

MARCKWORT.

LANDOLT (115) thinks that the highest aim in every treatment of strabismus should be the restoration of binocular vision. The first attempts should aim at removing or diminishing the deviation with the aid of glasses, atropine, and the stereoscope, while surgical treatment should be directed toward the obstacles which cannot be overcome in any other manner. After the normal position has been re-established the orthoptic exercises must be continued to regain binocular vision and thus make the cure permanent. The author reports nine cases, showing that this result can be obtained even under very difficult circumstances. In some of them there had never been binocular vision; in others there was a high degree of anisometropia, uni- or binocular amblyopia, and difficulty in uniting the retinal images on account of a difference in elevation. v. MITTELSTÄDT.

LIPPINCOTT (116) relates the clinical histories of two cases in which there was a sharply defined redness like an episcleritis over the tendon of the recti muscles, associated with muscular insufficiency and asthenopic symptoms. The symptoms disappeared on the use of strychnia and hot douches to the eyes.

BURNETT.

PRIESTLEY SMITH (117) injects cocaine under the conjunctiva.

WERNER.

TILLEY (118) reports a case of monocular diplopia in a girl of nine, which seems to be undoubted as to its genuineness, but for which no lesion in the eye could be found. Later she developed some cerebral disturbance of an obscure character, and abscesses appeared all over the body. BURNETT.

WADSWORTH (119) gives a full history of a case of recurrent paralysis of the motor oculi in a girl who was at the same time affected with otitis media; also the history of a sister who had other eye troubles probably dependent upon the same cause. In the author's opinion the paralysis is most likely due to a meningitis set up by the aural disease, which had exacerbations and remissions. BURNETT.

120. MOEBIUS, P. J. On congenital bilateral paralysis of the abducens and facial nerves. *Münchener med. Wochenschr.*, 1888, No. 6.

121. RANNEY, A. L. The treatment of functional nervous diseases by the relief of eye-strain. *N. Y. Med. Jour.*, Jan. 7 and 14, 1888.

122. SHAKESPEARE, E. O., and DE SCHWEINITZ, G. E. An un-

usual case of ciliary neuralgia with an erratic history : a clinical study. *Amer. Jour. Med. Sci.*, March, 1888.

123. SILVA. Un caso di optalmoplegia totale externa unilaterale di origine basilare. *Ann. di ottalm.*, vol. xvi., Nos. 5 and 6, p. 455.

124. THOMSEN. Acute alcoholic paralysis of the ocular muscles ending in recovery. *Berliner klin. Wochenschr.*, 1888, No. 2.

MOEBIUS (120) thinks that the congenital bilateral paralysis of the facial and abducens nerves is an idiopathic pathological condition. There is a lesion in the region of the two abducens nuclei.

RANNEY (121) is a thorough believer in the production of various functional nervous diseases by eye-strain, and is one of the most ardent defenders of the method of treatment by partial tenotomies of the recti muscles so largely practised by Dr. G. T. Stevens. Among the related cases of nervous disturbances relieved by these tenotomies were : chronic epilepsy, severe headaches, melancholia, cerebral neurasthenia, and chorea. The author makes the statement that he has never seen a case of typical periodical sick headache in which the eye muscles were not at fault. BURNETT.

In the case of SHAKESPEARE and DE SCHWEINITZ (122) the cause of the neuralgia was obscure, and the malady was not relieved after seven years of treatment. The eye symptoms were keratitis and corneal opacity, which finally resulted in obliteration of vision in the left eye. At her earnest solicitation the eye was enucleated, but in three weeks the pain made its appearance in the other eye, followed by a keratitis similar to that in the left. The fact that the attacks of pain started at the tendo oculi induced the surgeons to try Badal's operation of stretching and excising a piece of the supratrochlear nerve, but no permanent relief followed. The patient is still under observation, the pain recurring regularly every seven days. BURNETT.

SILVA (123) observed in the left eye of a farmer aged forty-eight complete paralysis of the optic and oculomotor nerves, marked paresis of the trochlearis and abducens nerves, and slight mydriasis ; the fundus was normal. In the right eye there was slight limitation of the color-field. The symptoms gradually vanished under the use of mercury and iodide of potassium, and at the end of a month there only remained red-blind-

ness and a few small defects of the visual field. The author is inclined to seek the cause of the various paralyses in a disturbance of the irrigation of the nerve-centres by the art. cerebralis profunda. DANTONE.

THOMSEN (124) observed a case of acute alcoholic paralysis of the ocular muscles, which was cured. He believes that the alcohol neuritis is of central origin in some cases, of peripheral in others.

## X.—ORBIT AND NEIGHBORING CAVITIES.

125. ADAMS. Pulsating tumor of the orbit with proptosis. *Ophth. Soc. Unit. Kingd.*, March 18, 1888.

126. ELSCHING. A case of hydrops of the frontal sinus. *Wiener med. Wochenschr.*, 1888, No. 14.

127. FANO. Fibrome sous-cutané du grand angle de l'orbite. *Jour. d'ocul. et de chir.*, Feb., 1888.

128. GOTTI. Una cisti sierosa dell'orbita. *Bull. di sci. med.*, vol. xxi., 1–2, p. 75.

129. HULKE. Pulsating tumor of the orbit with proptosis. *Ophth. Soc. Unit. Kingd.*, March, 1888. Exophthalmus after injury.

130. KÖHLER, A. Report of cases of injury of the optic nerve within the orbit. *Berliner klin. Wochenschr.*, 1888, No. 24.

131. LANNEGRACE. Relations de la toux nerveuse avec le goître exophthalmique. *Rev. des sci. med.*, vol. xxxi., 1, p. 114.

132. LAWFORD, J. B. Four cases of orbital sarcoma in children. *Ophth. Hosp. Rep.*, vol. xii., p. 43. Four cases.

133. PANAS. Hématome spontané de l'orbite, avec un nouveau fait clinique à l'appui. *Arch. d'ophth.*, vol. viii., 2, p. 153.

134. PESCHEL. Un caso di esoftalmo pulsante idiopatico. *Boll. d'ocul.*, vol. x., 1–2.

135. TILLAUX. Kyste séreux congénital de l'orbite. *Rec. d'ophth.*, 1888, No. 1, p. 1.

136. WILLIAMS, CORNELIUS. A case of rupture of the internal carotid artery within the cavernous sinus; pulsating exophthalmus; ligature of the internal carotid artery; death; autopsy. *Jour. Amer. Med. Assoc.*, Jan. 7, 1888.

137. YATES, PETER. Exostosis of orbit associated with cerebral tumor. *Brit. Med. Jour.*, March 24, 1888, p. 646.

ELSCHING'S (126) patient had been injured 12 years ago. Hydrops of the frontal sinus was the result. There was also limitation of the movements of the globe, and ptosis. The anterior wall of the sinus was opened and a piece removed, whereupon the eyeball recovered its normal position and mobility. Ptosis remained.

GOTTI (128) observed in the right orbit of a boy aged 14, a tumor which had existed for 2 months. It proved to be a serous cyst, and disappeared after it had been punctured and a compressive bandage applied. The eye had not suffered in any way.

In a man who had been shot with a revolver in the right temple, KÖHLER (130) saw exophthalmus, mydriasis, hemorrhages into the retina and vitreous, narrowness of the retinal arteries and tortuosity of the veins. Two months later the eye had become amaurotic, and the mobility limited. The bullet had injured the optic nerve, the external and internal recti muscles, and had then entered the nasal cavity.

PANAS (133) observed one of the rare cases of spontaneous hemorrhage into the orbit, which occurred in an unusually fat boy of 4 years, of healthy family, who frequently suffered with epistaxis, vomiting, and dilatation of the stomach, with dyspetic symptoms, but was otherwise healthy. When he awoke in the morning he could not open the left eye; the lids were œdematous but not discolored, the eyeball protruded and was almost immovable, the pupil wide and did not react; the ophthalmoscope showed a pale disc and dilated tortuous veins. V=0. On palpation the bulging lachrymal gland could be felt, likewise fluctuation of the contents of the orbit. An incision 3 *cm* deep was made between the eyeball and the orbital margin, whereupon a large quantity of fresh blood escaped. A drainage tube was inserted and a bandage applied, and the following day the eye had almost regained its normal position, the pupil reacted slightly, and a little sight had returned. The exophthalmus, however, soon returned, the boy bled from the nose and vomited, and a local phlegmon of the orbit developed, from which he slowly recovered. The disc remained pale, and the pupil reacted only consensually. In discussing the cause of the trouble the author comes to the conclusion that the orbital hemorrhage as well as the epistaxis, which occurred simultaneously with the vomiting, was due to a vasomotor irritation proceeding from the stomach, a careful examination failing to reveal any other source. Panas

thinks that the spontaneous hemorrhages into the vitreous occurring in young people may perhaps be ascribed to such reflex irritation proceeding from the stomach or other organs. As the wound may easily be disinfected and the hemorrhage may readily return, he thinks it advisable not to operate. v. MITTELSTÄDT.

PESCHEL (134) observed in a young man aged 15 pulsating exophthalmus, which had suddenly developed a month ago without any assignable cause, and was attended with severe headache. Besides the protrusion of the eyeball he found œdema of the temporal part of the palpebral conjunctiva and engorgement of the fundus; the aneurismatic noises could be heard all over the head. The blowing sound ceased on compression of the left carotid, but although this was done methodically for 9 days, the other symptoms increased to an alarming extent, paralysis of the abducent and then of the oculomotor nerve followed, and finally anæsthesia of the cornea and kerato-iritis. The common carotid was thereupon ligated, with good result: the above mentioned symptoms gradually disappeared, and 7 months later there remained only slight exophthalmus, a low murmur and slight paresis of the abducent. V had risen to $\frac{1}{3}$. The auther finds that none of the theories thus far advanced will explain his case, and, therefore, makes the diagnosis of a sudden rupture of the carotid within its passage through the cavernous sinus. The young patient felt perfectly well, with the exception of a strong inclination to palpitation of the heart and a more rapid pulse. DANTONE.

TILLAUX (135) describes a case of congenital cyst of the orbit and microphthalmus. In the lower part of the orbit there was a cyst which pushed the lower lid outward and had dislocated the very small eyeball upward. Besides remnants of a persistent pupillary membrane, he also found a coloboma of the choroid. In regard to sight, he only says: "These anomalies of development form at the expense of the functional integrity of the eye." As the cyst could not be reached from the conjunctiva, the incision was made through the skin of the lower lid. The cyst burst during the operation, and it was found to be united with the posterior part of the globe, so that it could not be cleanly removed. This was probably the cause why phlegmon of the orbit followed, which endangered the patient's life, so that Tillaux advises not to touch such cysts, unless the operator is prepared to remove the globe also. The microscopic examination revealed in the wall of the cyst transparent and parallel hyaline lamellæ, which were sepa-

rated by smooth cells. The tissue resembled that of the cornea more than that of the sclera. According to Tillaux the congenital cyst of the orbit with microphthalmus must be regarded as a diverticulum of the globe. MARCKWORT.

In WILLIAMS' (136) case a neuro-retinitis was associated with the other conditions. Death took place from a secondary hemorrhage. The post-mortem was imperfect and unsatisfactory. BURNETT.

In YATES' (137) case there was a hard, nodulated exostosis of the left orbital plate, encroaching on the cranial cavity and producing extreme proptosis. Associated with this was a myxomatous tumor of the frontal lobe. There was a history of slight epileptiform seizures; no pain or other symptoms. WERNER.

## XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

138. AHLFELD. The prevention of infectious disease of the eye during the first week of life. *Berliner klin. Wochenschr.*, 1888, No. 14.

139. BAAS. Toxic inflammation of the conjunctiva (due to a processionary caterpillar). *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxvi., p. 63.

140. CZERMAK. Symblepharon in both eyes following pemphigus. *Wiener med. Wochenschr.*, 1888. Observed in a boy aged four.

141. DOBBERKE, J. L. Periocular neoplasm in conjunctiva en orbitaal celweefsel. *Feestbundel Donders Jubileum*, 1888, p. 522.

142. v. ENGEL, G. The prophylactics of some diseases of the conjunctiva in the new-born. *Wiener med. Presse*, 1888, No. 8.

143. ERNST, P. On the bacillus xerosis and its manner of forming spores. *Zeitschr. f. Hygiene*, 1888, vol. iv.

144. FOERSTER. The pseudo-Egyptian ophthalmia. *Correspondenzbl. d. Verbandes d. Schles. Aerzte-Vereins*, 1888, No. 19.

145. GALLENGA. Brevi osservazioni sulla xerosis epiteliale e suoi microorganismi. *Ann. di ottalm.*, vol. xvi., 5–6, p. 493.

146. HANSEN GRUT, E. Conjunctivitis æstivalis. *Nord. ophth. Tidsskrift*, 1888, 1–2.

147. HOOR, CARL. The treatment of acute ophthalmo-blennorrhœa. *Wiener med. Wochenschr.*, 1888, Nos. 10 and 11.

148. JACOBSON, J. Contribution to the knowledge of follicular conjunctivitis (granular ophthalmia). Contribution to the pathology of the eye, Leipzig, 1888, p. 130.

149. MULES, P. H. Ophthalmia neonatorum : treatment by alcohol and corrosive sublimate. *Brit. Med. Jour.*, 1888, p. 244.

150. PETRESCO. Sur la nature microbienne des granulations conjonctivales. *Soc. franç. d'ophth.*, 1888.

151. PEUNOW. Contribution to the surgical treatment of trachoma. *Wjestnik ophth.*, 1888, No. 1. p. 1.

152. REICH, M. On the early and middle stages of the development of follicular conjunctivitis (trachoma). *Wratsch*, 1888, No. 7.

153. SATTLER, H. On a peculiar syphilitic affection of the conjunctiva. *Prager med. Wochenschr.*, 1888, No. 12.

154. SCHILLING. Endemic follicular conjunctivitis and trachoma. *Berliner klin. Wochenschr.*, 1888, No. 22.

155. SCHRÖDER, TH. A new method of the surgical treatment of chronic follicular trachoma. *St. Petersb. med. Wochenschr.*, 1888, No. 1.

156. STADERINI. Ricerche sulla istologia e sulla patogenesi della congiuntivite tracomatosa e sulla cura di questa mediante il sublimato corrosivo. *Ann. di ottalm.*, vol. xvi., 5–6, p. 367.

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158. TILLY, R. A case of pemphigus of the conjunctiva, with remarks. *Jour. Amer. Med. Assoc.*, Feb. 4, 1888.

159. VENNEMAN. Sur la diphthérie de la conjonctive et son traitment par le jus de citron. *Soc. franç. d'ophth.*, 1888.

160. WADSINSKI, P. On the surgical treatment of trachoma. *Wjestnik ophth.*, 1888, No. 2, p. 97.

161. WALLERSTEIN, H. On endemic acute follicular conjunctivitis. *Berliner klin. Wochenschr.*, 1888, No. 20.

AHLFELD (138) has lately abandoned the instillations according to Credé, but nevertheless has not observed any cases of blennorrhœa at the Marburg gynæcological clinic. As soon as the head has appeared he washes the face and eyes with ordinary water and then covers the child's face with a folded cloth, so that the vaginal discharge cannot come in contact with the eyes of the child. He

also recommends previous irrigations of the vagina with solutions of corrosive sublimate.

PAASS (139) observed severe conjunctival iritation in workmen into whose eyes the hairs and scales of the processionary caterpillar had fallen.

DOBBERKE (141) observed the development of clear, polypous nodules in a girl aged nine, which came from the ocular conjunctiva and the fornix, and which returned in a harder form when they were removed, so that half a year later total exenteration of the orbit became necessary, though sight was still quite good. The exenteration according to Langenbeck's method was entirely successful. The tumor consisted of three separate nodules, which were connected with the eyeball and conjunctiva by very loose connective tissue. Around the optic nerve a few nodules the size of a pea ware found, which were attached to it in a similar manner. The nature of the tumor was difficult to determine, as it resembled both a round-cell sarcoma and a lymphoma.

WESTHOFF.

According to v. ENGEL (142) the infection in blennorrhœa neonatorum does not take place in the vagina, but as soon as the head passes through the distended cervix uteri. He recommends Credé's method.

According to FOERSTER (144) the name "Egyptian ophthalmia" can no longer be justly applied, as the two forms which we now alone include in it, trachoma and follicular conjunctivitis, are not as infectious as the Egyptian ophthalmia was formerly supposed to be. He then describes the symptoms of both affections, their differential diagnosis and treatment, and maintains the relative harmlessness of trachoma when treated in time. He justly doubts the great infectiousness of the latter disease, as in the course of thirty years he has not seen a single case in which one of his attendants or a physician was infected.

According to GALLENGA (145) the cultures of the bacillus of xerosis succeed best on sterilized blood-serum, which may also be mixed with diseased, serous exudations from the various cavities of the body. On other soil the development is very feeble or fails entirely; weak solutions of eserine, atropine, or pilocarpine check it. The bacilli obtained from cultures, as well as from the xerotic spots, can be introduced into the conjunctival sac of man or under the conjunctiva of rabbits without producing any changes. As regards the cure of xerosis, the author attaches no

value to either eserine or sublimate ; benefit can be derived only from better hygienic conditions and better nourishment.

DANTONE.

HANSEN GRUT (146) considers the most characteristic symptom of the disease in question the flat granulations of the upper lid ; they may be very large, but are always flat. Vernal catarrh is often confounded with trachoma, but never produces scars or curvature of the tarsus ; the cornea is never attacked. The lower lid remains free from granulations. When the granulations have disappeared the conjunctiva becomes smooth and whitish, as though covered with a film of milk. To prevent the frequent relapses, the diseased epithelium and hyperplastic layer of mucous membrane must be destroyed ; the principal remedy is therefore Paquelin's thermo-cautery. SCHIÖTZ.

HOOR (147) at first uses ice-applications and frequently washes the eyes out with permanganate of potash.

JACOBSON (148) includes under follicular affections of the conjunctiva follicular catarrh, acute granular conjunctivitis, and trachoma, and separates them distinctly from catarrh of the conjunctiva, blennorrhœa, croup, and diphtheria, which he includes under the head of non-follicular diseases. He subdivides the follicular diseases of the conjunctiva into follicular catarrh (catarrh with swelling of the follicles) and follicular inflammation. The former develops without any symptoms, or with those of a more or less acute catarrh. Round, translucent, superficial nodules develop usually first in the lower fornix and the conjunctiva of the tarsus. The secretion consists of clear or somewhat flocculent tears, sometimes also films of mucus in the depth of the fornix. In all its other symptoms the clinical picture resembles that of the various forms of catarrh from the chronic to the hyperacute. All variations are due to complications. Follicular inflammation is one of the severest ocular affections on account of the numerous relapses and the participation of the cornea. The common and characteristic symptom of follicular inflammation is the development of follicles together with lymphoid infiltration, the source of which is the adenoid substance. Though beginning with great severity, it runs a tedious course, marked by exacerbations and relapses. Restitutio ad integrum rarely occurs, cannot be expected before the lapse of several months, and cannot be accomplished with certainty, even though treatment be begun at an early date The disease ends in induration, atrophy with

characteristic scars, total xerosis, and disastrous changes in the cornea, conditions which it may require years to develop and which may become stationary at any stage. Follicular catarrh heals under favorable circumstances without any treatment, or after frequent instillations of boric-acid solutions, the application of nitrate of silver, acetate of lead, sulphate of zinc. Follicular inflammation is cured occasionally in recent cases. This result may be attained with scarifications and cold applications, or with lukewarm applications and sulphate of copper. The prognosis is uncertain in either case, and relapses are frequent. The only effective is the operative treatment which frequently is a radical one, and which may be one of the three following: (1) Deep incisions of the upper conjunctiva tarsi, when the infiltration is recent; (2) excision of the upper fornix, when there is marked development of follicles in the retrotarsal fold and in the fornix; (3) partial or total excision of the tarsus and the diseased fornix down into the conjunctiva of the globe, in cases of marked general infiltration, and in the third stage. As regards transmission of the disease, it has been shown that it can spread through the discharge, and an atmospheric contagion is very probable.

Mules (149) treats blennorrhoic conjunctivitis by wiping the everted lids, and brushing them with alcohol; he also washes them with corrosive sublimate (1 : 2000).

Peunow (151) has tried the various operative procedures for trachoma, and favors the scraping out of the granulations with a sharp spoon. When, however, they form a fold, he excises the latter before scraping out the remaining granulations. When they cannot all be scraped out on account of marked infiltration, he presses out the remainder with the fingers or forceps. In this manner Peunow treated 180 patients, whom he divides into three groups. The first—43 patients—comprises those cases in which the trachoma-granules had developed upon the normal or only slightly hyperæmic conjunctiva. The results were excellent. The treatment lasted from ten to thirty days; the spoon was used from one to three days. All were completely cured. Thus far no relapses (some were treated more than a year ago). Second group—102 patients—trachoma with marked hyperæmia and swelling of the conjunctiva, and muco-purulent discharge. Length of treatment, fifteen to sixty days; the spoon was used from two to five days. Fifty patients were completely cured; in 32 there was thickening of the palpebral conjunctiva, while in the

remainder there was thickening and unevenness of the conjunctiva; in three some granulations remained, as they lay deep in the tissue, and could not therefore be perfectly scraped out. Peunow did not observe any relapses among those discharged cured. Third group—35 patients—trachoma with scars of the conjunctiva and corneal complications. Length of treatment, two months and more. In some cases there remained unevenness and pannus, which yielded to jequirity. HIRSCHMANN.

REICH (152) is against the recognition of a special, not specific, follicular conjunctivitis (as demanded by Adamück) among the various forms of trachoma. Folliculosis, identical with the follicular conjunctivitis of Chodin and Saemisch, the conjunctivitis follicularis simplex of Raehlmann, the trachoma folliculare of Mandelstamm, and the conjunctivitis follicularis incipiens or trachoma follicularis incipiens of the author, is only a milder or early stage of typical trachoma, into the more severe forms of which it frequently passes. Every form of trachoma may develop, according to Reich, either from direct infection, or from unhealthy hygienic conditions. HIRSCHMANN.

SCHILLING (154) found follicular conjunctivitis in school-children whose parents had trachoma, and catarrhal conjunctivitis in children between the ages of one and six. Frequently one eye was already trachomatous, while the other had follicular conjunctivitis, which soon passed into trachoma, a proof of how the former affection will pass into the latter.

SCHRÖDER (155) removes the follicles from the conjunctiva with a specially constructed wire brush.

STADERINI (156) describes at length his investigations on the etiology, histology, and treatment of trachoma. Positive results were obtained in all cases with cultures on gelatine, prepared from the contents of the trachoma-granules. The diplococcus which he found, and which he calls the trachomacoccus, closely resembles the gonococcus, but is much smaller; introduced under the conjunctiva it produces trachoma, especially in poorly nourished animals. The author has always found the specific coccus in groups of three to nine, and more in the protoplasm of the lymph-cells of trachoma; rarely in the fibrous tissue of the granule, or in the connective tissue of the conjunctiva. As regards treatment, he again recommends the daily brushing with the sublimate solution 1 : 500, and also the instillation twice daily of a solution 1 : 2000. When there is much discharge, nitrate of silver may be used alternately with the sublimate. DANTONE.

THEOBALD (157) thinks the fact that pterygium usually occurs over the tendon of the recti muscles, should lend plausibility to the theory that hyperæmia of the blood-vessels in the vicinity of these tendons, the vascular supply of which is relatively great, has much influence in the development of the condition.

TILLY'S (158) case was that of a boy whose eye trouble began when he was five years old, after vaccination. When seen for the first time, a year after, both eyes were blind, from obliteration of the conjunctiva and adhesion of the lids to the eyeball, and a horny pedicle which covered the front of the ball between the borders of the lids. The puncta were obliterated. Bullæ were found on other portions of the body. The author concludes that this is a case of that rare affection, pemphigus of the conjunctiva.

BURNETT.

VENNEMAN (159) recommends tannin for diphtheritic conjunctivitis. Petresco prefers lemon-juice; this remedy is thereupon warmly recommended by Abadie; he cauterizes the whole surface of the conjunctiva with lemon-juice every six hours.

WADSINSKI (160) prefers pressing out the trachoma-granules after Wicherkiewicz, Kramszkyk, and Hotz to every other surgical procedure. He has tried this method on 100 patients, and gives the history of 50 cases treated at the clinic. In 15 cases he obtained very satisfactory, in 24 moderate, results; 4 cases were failures.

WALLERSTEIN (161) observed an endemic of follicular conjunctivitis in Gelsenkirchen and its neighborhood, where he found a marked swelling of the follicles under the upper lid.

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182. Verdese. Contributo alla anatomia patologica dell' ulcus serpens della cornea. *Ann. di ottalm.*, vol. xvii., 1, p. 67.

183. Wagenmann, A. Experimental investigations of the question of keratoplasty. *v. Græfe's Arch. f. Ophth.*, vol. xxxiv., 1, p. 211.

184. Williams. What causes arcus senilis. *St. Louis Med. and Surg. Jour.*, vol. liv., 12, p. 211.

In cases of keratoconus Fieuzal (164) excised an elliptical

piece of cornea as recommended by Galezowski; in three of four cases operated in this manner anterior synechiæ formed. Fieuzal has therefore abandoned this method, and now touches the cornea with the galvano-cautery in cases of keratoconus. Wecker is opposed to this cauterization, as broad scars must be produced before the cornea can be sufficiently flattened.

MARCKWORT.

GALEZOWSKI (165) describes a case of melanotic epithelioma which had almost surrounded the whole cornea like a ring. The neoplasm had once before been removed by an oculist. Galezowski removed it and then treated it with the galvano-cautery; nevertheless a relapse occurred, whereupon he repeated the operation. (The publication of the case followed so soon that there has been no time for a second relapse to develop.—The Rev.)

MARCKWORT.

v. HIPPEL (166) had found before that in transplantations of the cornea the transplanted flap is destroyed only in exceptional cases. It is sufficiently nourished from the edge to be preserved. The development of new tissue at its posterior surface is a very undesirable, but not necessary occurrence in the process of healing, and speedily destroys the optical result. But the disc may also lose its transparency at an early date without the formation of this tissue from the iris, after its tissue has swollen by imbibition and the epithelium has been more or less cast off. In view of the investigations of Leber on the interchange of liquid in the eye, according to which the transparency of the cornea depends upon the integrity of the epithelium of Descemet's membrane, Hippel concluded that the transparency of the transplanted disc can only be maintained by preserving Descemet's membrane, as thereby the injurious effect of the aqueous is prevented. He therefore performed partial transplantation of the cornea by excising from the leucoma with a specially constructed trephine a piece 4 *mm* in diameter, which he removed from Descemet's membrane with the aid of a Graefe knife. A disc about 1 *mm* in diameter was then excised from the cornea of a dog or rabbit and placed in the defect. The disc became opaque only in those cases in which it had been injured. Only those cases are suitable in which the leucoma does not extend through the whole thickness of the cornea and is not adherent. Among eight cases operated according to this method, Hippel obtained good results in five. From this he concludes that transplantation of

the cornea with preservation of its transparency is feasible after his method, that it should be tried even when the leucoma extends through the whole thickness of the cornea, while the total adherent or projecting leucomas must not be touched. The operation is not dangerous, and does not cause the patient much discomfort.

According to HIRSCHBERG (167) diffuse keratitis from congenital syphilis is always accompanied with new formation of blood-vessels, which never disappear. After some time the cornea may appear perfectly transparent to the unaided eye, but under the magnifying glass numerous bloodvessels may be seen ramifying from the margin towards the centre of the cornea and there uniting with those coming from the other side. When the cornea remains slightly hazy, the magnifying glass reveals new-formed blood-vessels as the cause.

MANZ (168) discusses suppuration of the cornea in smallpox, typhoid fever, cholera, xerosis of the conjunctiva, and icterus.

In malaria VAN MILLINGEN (171) observed a keratitis in which there was an erosion at the temporal edge of the cornea. A defect in the epithelium is the first symptom noted. This portion soon becomes hazy. An ulcer forms, which advances towards the centre. The cornea does not perforate. There may be no pain whatever, and the cornea is usually anæsthetic. The whole process is a torpid one, but the ulcer develops rapidly. Recovery by cicatrization is slow. Usually dense opacities of the centre of the cornea remain.

PARISOTTI (172) recommends keratotomy or paracentesis respectively in corneal abscess, serpent ulcer, torpid ulcer, infiltration with hypopyon, etc. Even in simple corneal ulcer he recommends paracentesis (which is going rather too far.—The Rev.).

MARCKWORT.

PERLIA (173) observed a blister containing a clear liquid on the centre of the cornea of a man aged 60. The anterior wall was removed, but a week later a new blister had developed, and another week later a third. The patient was finally cured, but an opacity remained behind.

RAMPOLDI (175) describes two more cases of infiltration of the cornea with blood when the head was inclined forward. In both there was blood in the anterior chamber—in the one the result of an iridectomy made the day before, in the other the result of a traumatic iridodialysis. The latter observation induced the

author to make experiments on rabbits. The iris was detached with forceps and the eye enucleated two days later. Even with the naked eye a reddish color of that part of the cornea lying nearest the detached iris was noticeable. When specimens were examined under the microscope, it was found that red blood-corpuscles had entered beneath the endothelium of Descemet's membrane and between the posterior lamellæ of the cornea, while the anterior layers only seemed saturated with lymph.

Rosmini (176) reports a case of keratoconus in which glaucoma had developed, for which iridectomy was twice performed without success, while once a portion of the keratoconus was abscised. The glaucomatous symptoms, however, disappeared after a series of 30 paracenteses of the cornea, performed by the late Pierd'houy; the keratoconus became flat and vision good. A year and a half later no change was observed. Dantone.

Scimeni (177) has investigated the septic effects of hypopyon with the aid of cultures and inoculations. He obtained the material from human eyes affected with hypopyon keratitis, and then from rabbits' eyes in which he had produced purulent keratitis by the introduction of pyogenic cocci, and finally from rabbits' eyes in which the hypopyon had been produced by chemical irritation, especially by the introduction of mercury into the anterior chamber. After numerous experiments he came to the following conclusions: (1) No micro-organisms are found, as a rule, in the hypopyon of small corneal ulcers; but they may be observed in deep and extensive ulcers, even though there may be no perforation of the cornea, and then always belong to the species which has produced the keratitis; (2) as the presence of micro-organisms in the anterior chamber is not necessary for the production of hypopyon, it is probable that the suppuration is due to chemical substances, which are derived from the micro-organisms in the cornea and penetrate into the anterior chamber; (3) sterilized metallic mercury, introduced into the anterior chamber, produces a hypopyon which is entirely independent of micro-organisms.

Dantone.

Seggel (178) operated a straphyloma resulting from blennorrhœa and subsequent perforation of the cornea by inserting a suture around the whole cornea at its margin, splitting the staphyloma with a Beer knife, abscising the two halves with scissors and then closing the wound by pulling the suture tight.

Trousseau (180) found that among 40 cases of keratitis paren-

chymatosa hereditary syphilis was undoubtedly the cause in 18: in the remainder syphilis was more or less probable.

MARCKWORT.

VERDESE (182) made a careful microscopic examination of an eye affected with beginning hypopyon-keratitis and enucleated post-mortem, and found a small rupture of Descemet's membrane, although the ulcer had only penetrated one third of the thickness of the cornea. The layers behind the ulcer as far as Descemet's membrane were infiltrated with leucocytes, but otherwise unaltered; the iris was entirely normal. The author therefore concludes that hypopyon is always due to bursting of Descemet's membrane and the entrance of leucocytes from the ulcer, though a perforation of the whole cornea is not necessary.

DANTONE.

In making his experiments on keratoplasty WAGENMANN (183) first took flaps from the cornea of rabbits which were left in partial communication with it. They healed in and remained transparent. The flap was nourished by diffusion from the edge. He also cut discs out entirely and then re-attached them in their old places with silk sutures. In three cases the centre of the flap remained clear. A fibrinous substance was found to have united the edges of the wound, and was gradually changed to a firm scar. Nutrition took place by diffusion. Formation of granular tissue was not observed, neither did the flap become vascular. When it becomes opaque infection may be the cause. Another cause may be found in the opening of the anterior chamber. As the endothelium has disappeared, the aqueous causes the tissue to swell, thereby disturbing the nutrition of the cells, as well as of the parenchyma. Flaps the endothelium of which has been removed take root, but they become opaque and remain so. The aqueous may also act, however, from the edges of the wound, thereby causing the margin of the flap to become opaque, which opacity is the greater the more the edges have suffered or the more the lamellæ were forced apart.

185. DUFOUR. Traitement de la sclérite par le salicylate de lithium. *Soc. franç. d'ophth.*, 1888.

186. GAYET. Deux tumeurs symétriques des globes oculaires. *Arch. d'ophth.*, vol. viii., 1, p. 18.

187. NUEL. Des ruptures scléro-cornéennes principalement au point de vue de leur traitement. *Festbundel Donders Jubileum*, 1888, p. 273.

188. WEBSTER, D. A new method of treating episcleritis. *Iuternat. Four. Surg. and Antisept.*, Jan., 1888.

DUFOUR (185) recommends the salicylate of lithium in scleritis; he thinks this disease is due in the great majority of cases to rheumatism. Panas also obtained good results with it. Grand-clément recommends antipyrin in scleritis. MARCKWORT.

GAYET (186) observed in both eyes of a man aged about forty a ring composed of numerous tangent whitish-yellow infiltrations situated at the margin of the cornea. The affection had existed for several years. Every method of treatment, among others also the galvano-caustic, failed. Enucleation finally became necessary, as the severe pain continued even after the eyes had become blind from the total infiltration of the cornea. The posterior portion of the sclera was found to be much thickened in consequence of lymphoid infiltration, which gradually decreased from the optic nerve towards the equator. The uveal tract was also infiltrated with lymph-cells, especially the cornea, which showed fatty degeneration of these elements and formation of vacuoles with atheromatous contents. In other respects the eyes were normal. (For details see the original.) As the infiltration was most marked in the neighborhood of the blood-vessels and the principal changes were found at the posterior pole at the entrance of the ciliary vessels, the author assumes that an inflammatory process started at this point and compares it with the symmetrical orbital tumors previously described by him, there being a striking resemblance in the microscopical structure of the two formations. He therefore makes the diagnosis: lymphoid tumors of an inflammatory nature, which developed in both orbits, but especially at the expense of the eyeballs. v. MITTELSTÄDT.

NUEL (187) does not attempt, like Landesberg, to cure the staphylomas developing after injuries by numerous incisions, but makes a broad sclerotomy through the middle of the staphyloma, preserving, however, a large conjunctival flap and covering the wound with it. The edges of the wound are united with a suture which is introduced subconjunctivally at the equator, crosses the wound, passes around the cornea beneath the conjunctiva, and is tied below. In a patient who had been treated after this method the staphyloma had disappeared after twenty days and the sight had been much improved. WESTHOFF.

WEBSTER (188) has been successful in treating episcleritis by means of the actual cautery. Two applications at intervals of

three days have usually been sufficient to effect a cure. Three cases are reported. BURNETT.

189. BOCK, E. Lumps of pigment freely movable in the anterior chamber. Anatomical examination of the whole eyeball. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxvi., p. 163.

BOCK (189) observed in a case during life lumps of pigment freely movable in the anterior chamber. The anatomical examination showed that they consisted of pigmented cells, like those of the uveal layer of the iris. They were most likely remnants of the membrana capsulo-pupillaris, which had become detached from the iris and floated about in the aqueous humor.

## REVIEWS.

**Dioptric Formulæ for Combined Cylindrical Lenses.** Applicable for all angular deviations of their axes, with six original diagrams and one albertype plate. By CHAS. F. PRENTICE. 8vo., pp. 48. New York: James Prentice & Son. 1888. Price, $3.00.

This little brochure is an endeavor to solve the problem of combined cylinders in all its aspects, and in a manner simple enough for the comprehension of the average student of ophthalmology. The author is to be congratulated upon the success that has crowned his labors, for nowhere is there to be found so simple and yet so complete an explanation of the question as is contained in these forty-eight pages.

The author's method of procedure is somewhat different in detail from that pursued by those who have dealt with the subject hitherto. He discusses the question wholly by geometrical construction, and in accordance with the laws of mechanics respecting the resultant of two combined forces acting in different directions—a method peculiarly applicable to the cylinder whose action on the rays of light is always in a direction at right angles to its axis and towards its focal line parallel to the axis. Taking two cylinders then with their axes crossing at any given angle, and we have the following data from which to obtain the properties of the combined lenses, viz.: (1) the angle $\gamma$, formed by the crossing of the axes ($c_1$ $C^1$ in figure [1]),—planes of nore fraction,—which is equal to the angle formed by the crossing of the planes of greatest refraction; (2) the focal distances $f^1$ and $f^2$ (o, $o_1$ and o, $o_2$) of the two lenses (c and C) respectively. The final direction of any ray after its passage through the combined lenses will depend upon the relations of these two factors to each other.

[1] Plate I. reproduced at the end of this volume by permission of the author.

In working out the problem it has been necessary to limit strictly the meaning of certain terms. Thus, the focal plane of each lens taken separately is denominated an *elementary* plane ($E_1$ and $E_2$ in the figure), whereas the *primary* and *secondary* planes are taken to be those formed by the action of the two lenses conjointly ($YO_1$ and $XO_2$ in the figure). Combined lenses of the same kind (positive or negative) are called, for convenience, *congeneric*, while those of opposite kinds are called *contra-generic*. Now the resultant primary and secondary planes will, according to the parallelogram of forces, lie between the planes, active or passive, of the two combined cylinders, and will of course divide the angle $\gamma$ into two angles, $\alpha$ and $\beta$; that is to say, $\gamma = \alpha + \beta$. The position of this plane (primary or secondary) in respect to the planes (active or passive) of either of the lenses depends again upon the relation of $\alpha$ to $\beta$.

By simple geometrical construction, Mr Prentice shows that

$$\text{Sin } 2\beta = \sin 2\alpha \frac{f_1}{f_2}, \quad (7)$$

both for the primary and the secondary plane, and from this gets his first proposition—that

"The primary and secondary planes of refraction are at right angles to each other for any angular deviation of the axes of two combined congeneric cylinders."

In examining equation (7) we find that the sines of the double angles differ only by $\frac{f_1}{f_2}$. If $f^1 = f^2$, as in the case where the lenses are of equal power, $\alpha = \beta = \frac{\gamma}{2}$, and hence:

"For combined congeneric cylinders of equal refraction the primary plane equally divides the angle between the active planes of the cylinders, and the secondary plane similarly divides the angle between the axial planes of the cylinders."

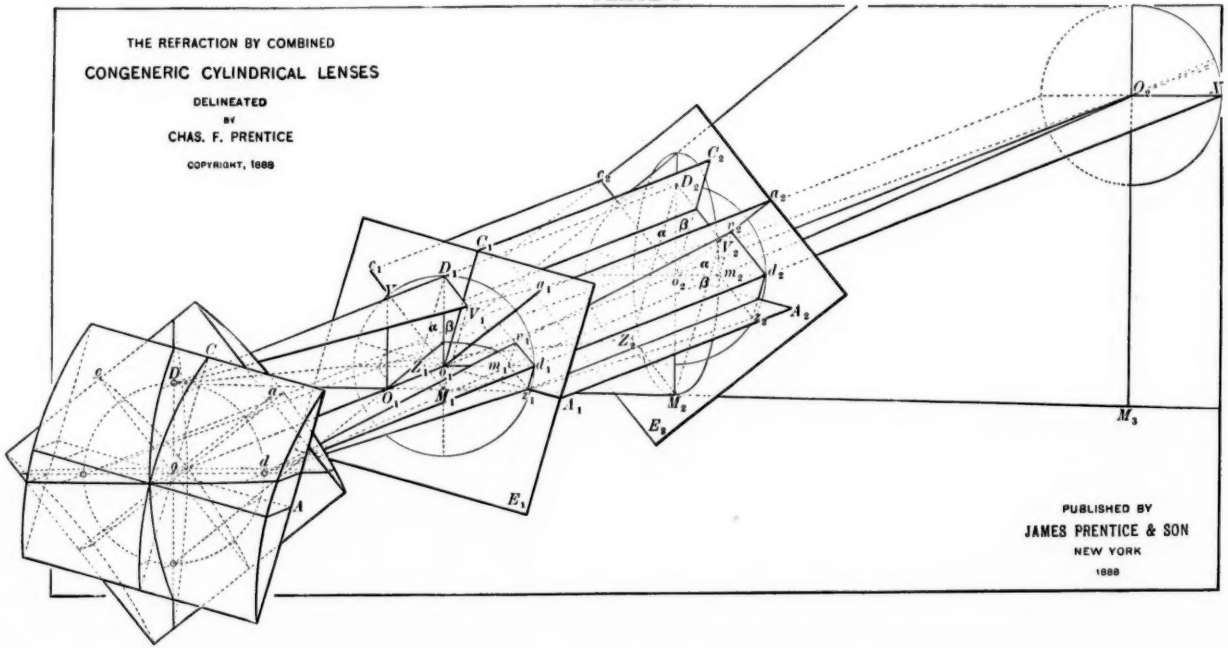
On the other hand, when the cylinders are of unequal refraction "the primary plane will be nearer the active plane of the stronger cylinder."

The equations for obtaining the actual values of $\alpha$ and $\beta$ are somewhat lengthy, and we give only the resultant:

$$\text{Cos } \alpha = \sqrt{\tfrac{1}{2} + \tfrac{1}{2} \frac{f_1 + f_2 \cos 2\gamma}{\sqrt{f_1^2 + 2f_1 f_2 \cos 2\gamma + f_2^2}}} \quad (1)$$

The value of $\beta$ is found of course by $\gamma - \alpha = \beta$. The direction of the axes of the combination being now known, the position of the focal planes is next to be determined.

PLATE I


THE REFRACTION BY COMBINED
CONGENERIC CYLINDRICAL LENSES
DELINEATED
BY
CHAS. F. PRENTICE
COPYRIGHT, 1888
PUBLISHED BY
JAMES PRENTICE & SON
NEW YORK
1888

The formula, as worked out by the same method for the primary plane, is :

$$F^1 = \frac{f_1 f_2}{\sqrt{\frac{(f_1+f_2)^2}{2} - f_1 f_2 \sin^2\gamma + (f_1+f_2)\sqrt{\frac{(f_1+f_2)^2}{4} - f_1 f_2 \sin^2\gamma}}}. \quad \text{(II)}$$

The value of $F^2$ for the second focal plane is the same as this precisely, except that there is a minus instead of a plus sign in the denominator between $\sin^2\gamma$ and $(f_1+f_2)$.

When the cylinders are of equal power $(f_1 = f_2 = f)$, the formula is reduced to the simple form of

$$F^1 = \frac{f}{1+\cos\gamma} \text{ (IV)},$$

for $F^2$ it is the same, except that there is a minus instead of a plus sign in the denominator.

From the foregoing formulæ it is shown that when the "axes of the cylinders coincide the primary focal plane is defined by the sum of the refraction of the cylinders, whereas the secondary focal plane will be at infinity"; and, on the other hand, "that the primary and secondary focal planes correspond with the elementary focal planes when the axes of congeneric cylinders of unequal refraction are at right angles to each other."

Another interesting deduction from these formulæ is the fact which has apparently hitherto been overlooked, that "the primary and secondary focal planes are conjugate planes, subject to variations of the angle between the axes of the congeneric cylinders."

The formulæ for the contra-generic cylinders are discussed in the same exhaustive manner, but in accordance with the same general principles, and it is therefore unnecessary to continue them in detail.

Part III. is given to the manner of converting these equations into actual refraction expressed in dioptries. Part IV. considers the sphero-cylindrical equivalence of combined cylinders, showing how all crossed cylinders have their exact expression in a sphero-cylindrical lens. A verification of the formulæ by actual experiment with lenses is given in Part V. The frontispiece is a beautifully executed photograph of a set of models which Mr. Prentice has constructed to exhibit the action of the laws he discusses in his formulæ ; or, to speak more properly, it was the construction of the models which led to the working out of the formulæ.

The six diagrams which serve as illustrations of the geometrical construction (one of which is here given by permission of the author) are marvels of mechanical drawing, and surpass any thing of the kind that has come under the reviewer's notice. S. M. B.

**Hand-Book for Opticians.** A concise and comprehensive treatise on the theory of the optical trade and of its mechanical manipulations. By W. BOHNE, optician, 119 Canal Street, New Orleans, La., 1888. Price, $2.50.

This book of 107 pages, with numerous diagrams, although written for practical opticians, will be read with benefit also by oculists. It gives much needed information on many points which are neither taught in our medical schools nor mentioned in our text-books. Some of them we may point out. Chapter II. corrects the common error: "Flint glass and rock crystal are harder than crown glass" (Donders). "I do not understand, says the author, how this error could slip into so many medical books, as the simple test of scratching the one with the other will show at once that flint glass is softer than crown glass." This chapter and the next describe the manufacture, composition, and properties of the different kinds of glasses used for lenses. "Crown glass and pebbles are the only rivals for spectacle lenses. Crown glass is the hardest of all glasses, and at the same time much cheaper than flint glass. . . . In rehearsing the merits of pebbles we find that their hardness and clearness surpass those of any glass, and that their dispersing power is the lowest of all lenses manufactured for optical purposes."

Chapter V. describes the manner in which the optical centre of a lens is found, namely, by looking through the lens at a straight line and mark the direction (optical line) on the lens through which the line appears unbroken, then look through the lens when turned 90°, and find again the optical line. The crossing point of these two lines is the optical centre of the lens. Our author says, this important problem had puzzled him greatly at the beginning of his career, yet it has been known for a long time. The reviewer, when a student, learned it from an optician in Heidelberg in 1860, and yet he must say that among the members of the Heidelberg Ophthalmological Society none seemed to know it at that time, and he may add that the test can be made a little more expeditious, as follows: Look through the lens at two lines crossing each other; when the prolongations of the lines beyond the lens are unbroken, the point of the lens through which we see the crossing point of the lines is the optical centre of the lens. The decentration of glasses rests on the same experiment.

Chapter VIII., measuring of compound lenses and their correct setting, is the most useful for the oculist. How often have we

to determine the kind and strength of spectacles worn by patients who have no formula with them. The problem for spherical glasses is indeed easy enough, but when we have to deal with sphero-cylindrical, or sphero-cylindro-prismatic glasses, the problem is not so simple, though it can always be solved by determining the optical centre of spherical and the axis of cylindrical glasses while watching the apparent motions of objects seen through the moving lens; further by determining the focal length either directly or by the magnifying or diminishing effect, comparing it with lenses of known strength, and again watching the apparent movements of objects through the neutralized pair of lenses. All these rules—which are well known, it is true—are plainly detailed by our author and exemplified by a number of drill problems.

Chapter XI., the proportion of caloric rays in the different kinds of light, describes some very interesting experiments.

The other chapters, though pleasant reading, do not add much to the stock of knowledge possessed by an oculist of average education.

We can fairly recommend the book, though its price, $2.50 for 107 pages, is out of proportion. H. K.

**The Transactions of the Seventh International Ophthalmological Congress,** held in Heidelberg last August, have appeared in a volume of 538 pages, edited by O. Becker and W. Hess. Published by F. I. Bergmann, Wiesbaden.

This congress was the most successful ophthalmological gathering ever held. The papers and discussions represent the actual standpoint of ophthalmology more fully than those of any national society can do. They are printed in the languages of the authors, and treat of almost all important questions in ophthalmology. We need not recommend this volume to our readers, for it seems self-evident that every oculist will read and study it for himself; so much the more, as the reports of the congress that have appeared in different periodicals have been singularly imperfect, most of them reprinting only the extracts which a number of speakers distributed on slips of paper, whereas a good deal of original work, not made so convenient for the reporters, was left either unmentioned or spoken of incorrectly. To return to the source is in this case particularly desirable, for the members of the congress pledged themselves to publish their papers in the Transactions only—a rule which ought to be adopted in all societies that publish their proceedings. H. K.

# In Memoriam.

## ELKANAH WILLIAMS, A.M., M.D., OF CINCINNATI.

Death has recently claimed several eminent members of the medical profession, and conspicuous among them is the name of Dr. E. Williams, of Cincinnati.

In the specialty of the diseases of the eye, he was one of the pioneers, as he quit general practice in 1852 and went abroad for better opportunities of study and observation than he could obtain at home. He spent about two years and a half in Germany, France, and England, visiting the various clinics and hospitals. The time chosen was fortunate, as ophthalmology was then undergoing a process of evolution from an obscure and uncertain specialty to a tolerably well-defined exact science. This change was brought about by the invention of the ophthalmoscope, which cast its welcome light into a cavity which before had been dark, except to post-mortem sections. Ideas of intraocular diseases were revolutionized as well as their treatment.

Dr. Williams was fortunate enough to study with Arlt, Jaeger, Von Graefe, Sichel, and Desmarres, during the period of these new developments. He had the honor to demonstrate the use of the ophthalmoscope to the staff of the Moorfields Hospital, London.

He returned to Cincinnati in 1855, and began to practise. His progress at first was slow, as the profession had not learned to appreciate the value of a specialist, but his superior qualifications soon became manifest, and erelong he had substantial evidences of his professional success. His genial manner, his kindly

face, his high professional attainments, his sympathy for his patients, combined to give him qualities which made him popular among his clients.

He was Professor of Ophthalmology in the Miami Medical College after its reorganization in 1865, and held this position until failing health compelled him to give it up. For many years he served as oculist on the staff of the Cincinnati Hospital.

During the early years of his practice he was a frequent contributor to the medical journals, but during later years, as his professional work increased, he wrote less frequently. As a lecturer he excelled ; his flow of language was easy, and his intimate knowledge of the literature of his specialty, and his extensive experience, made his clinical and didactic lectures very attractive to students as well as practitioners.

He was an honorary member of the Medical Society of Athens, Greece, and also of the Ophthalmological Society of the United Kingdom. In 1875 he was elected President of the Medical Society of Ohio. In 1876 he was Chairman of the section of Ophthalmology of the Medical Congress which convened at Philadelphia.

He has left the record of a pure and earnest life, devoted to his profession. His name was extensively known in Europe and this country, and his professional success was phenomenal, but it was a success which he had earned and which he well deserved.

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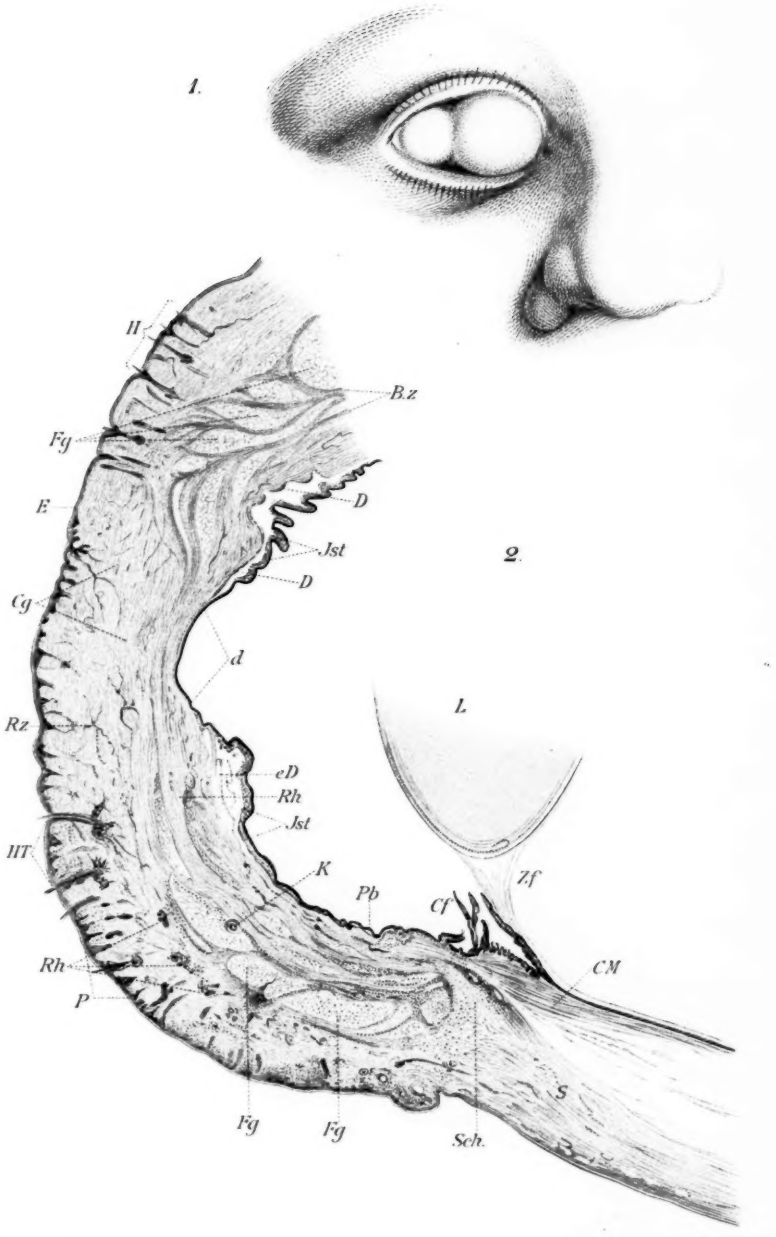


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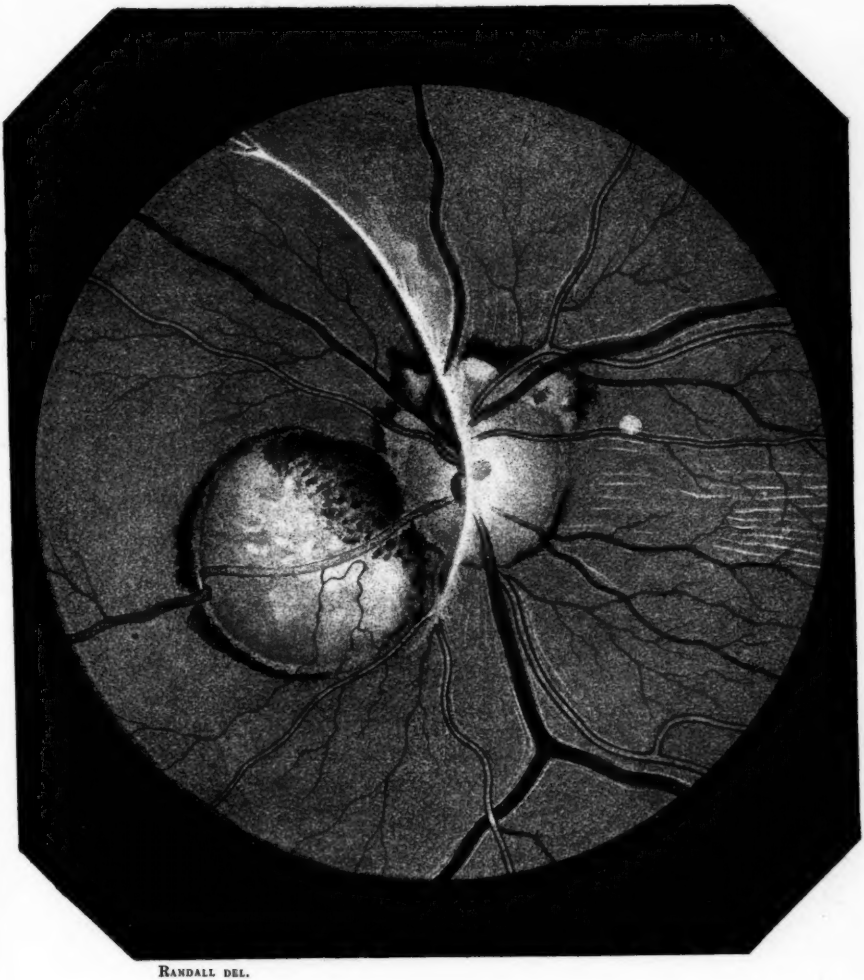

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AND

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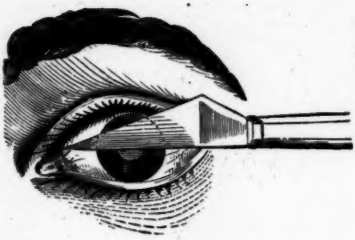

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